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(6) ENGINE PROPOSAL
FOR PHASE III OF THE
SUPERSONIC TRANSPORT DEVELOPMENT PROGRAM.

VOLUME VI.
COSTS.

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(COMPETITIVE DATA)

PREPARED FOR
FEDERAL AVIATION AGENCY
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Pratt & Whitney Aircraft DIVISION OF UNITED AIRCRAFT CORPORATION
FLORIDA RESEARCH AND DEVELOPMENT CENTER

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SECTION I
INTRODUCTION

This revision to the Cost Baseline Report for Phases III, IV, and V for the JTF17 Supersonic Transport Engine Program is submitted herewith in accordance with the requirements of Exhibit 5A of the Federal Aviation Agency's Request for Proposal dated June 30, 1966. As required by the Request for Proposal, cost, technical, and scheduling information required by the airframe contractors to make primary engine selection was provided on August 8, 1966. Copies of letters which furnished this information to The Boeing Company and the Lockheed Aircraft Corporation were forwarded to the Federal Aviation Agency by our letter dated August 8, 1966. Advance information concerning overhead and labor rates used in the cost estimates for this revision to the Baseline Report was provided to the Defense Contract Audit Agency resident auditors and the Federal Aviation Agency on August 1, 1966, for analysis and review.

The time spans and milestone dates for Phases III, IV, and V have been revised from those contained in our Cost Baseline Report FP 65-152 dated December 30, 1965, and revision FP 65-152A dated April 15, 1966, and are shown on the Master Schedule Chart, figure 1. An examination of these major milestone dates for each of the airframe contractors indicated that the dates for each were close enough to the other to permit the arbitrary selection of a midpoint as the milestone date for both, for the purpose of estimating the cost. The variation caused by such arbitrary selection of date is substantially less than the allowance for error. The differences in engine configuration between the engines for the two airframe companies are minor and may be ignored for cost estimating purposes. We are thus able to present, in this volume, estimates which are identical for each airframe manufacturer. We would expect that the milestones in our Detail Work Plans would subsequently be adjusted slightly to coincide with those of the selected airframe contractor.

For cost estimating purposes, we have assumed that Phase III covers the JTF17 engine program from January 1, 1967, through September 15, 1970, and includes the JTF17 engine design and development effort through the Flight Test Status (FTS) point in June 1969 and through 100 hours of SST prototype aircraft flight test. Twenty (20) prototype engines are to be fabricated and delivered, and six engine overhauls are scheduled during this Phase. This schedule assumes that authorization to procure Phase III long lead-time hardware will be received by September 30, 1966, pursuant to Pratt & Whitney Aircraft's proposal FP 66-85 dated June 27, 1966.

The Phase III Work Breakdown Structure has been established to meet with the Federal Aviation Agency's requirements. A cross-reference index of our proposed Work Statement items compared with the structure included in the Request for Proposal Section 3, Part II, is included herein as figure 2.

The Phase III and Phase IV Cost Baseline estimates presume the rent-free use of existing facilities, as presented in the Facilities Plan contained in Volume V. It is proposed that additional facilities, except those which may be furnished by the Government from already existing sources, be company financed.

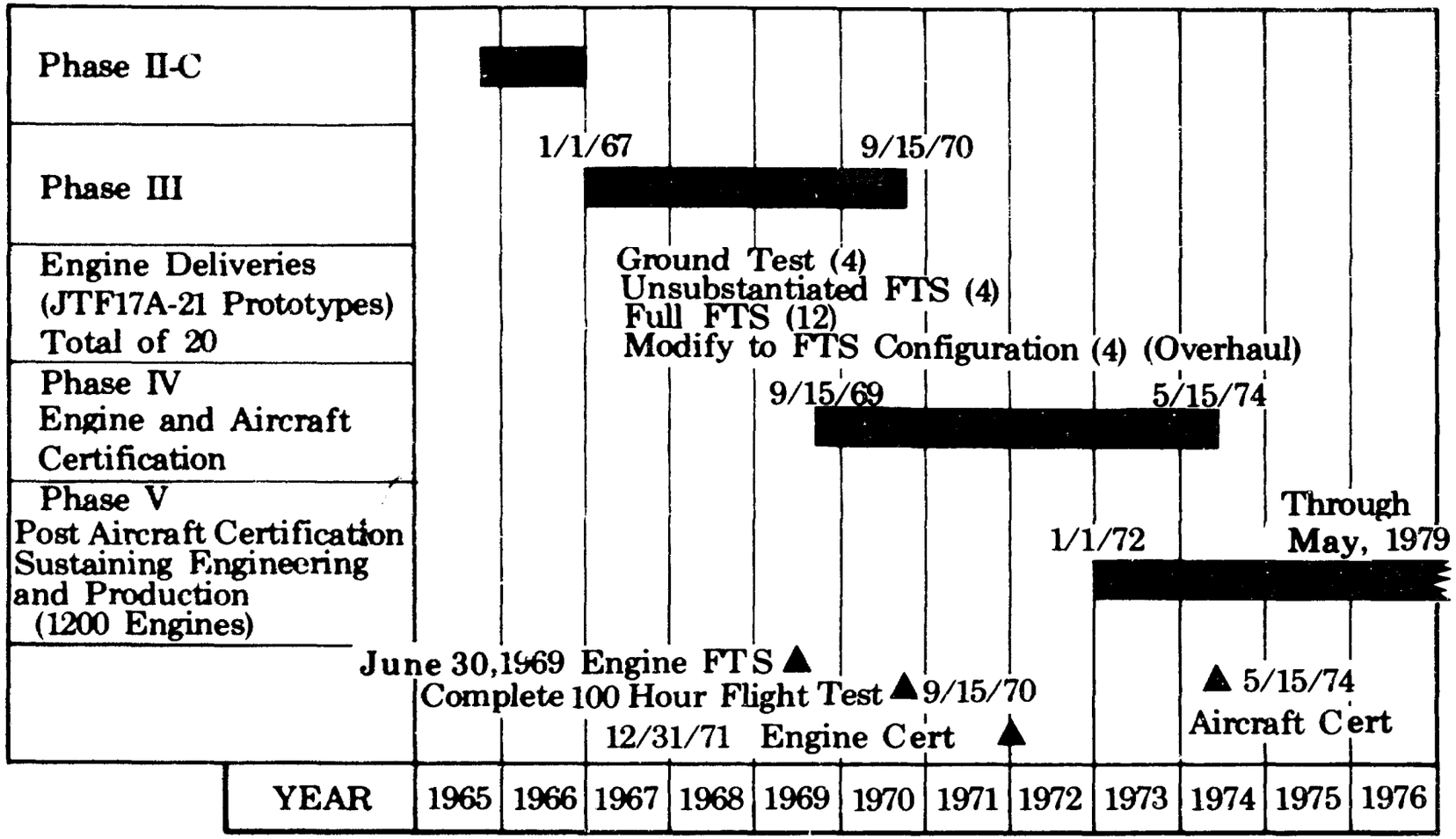

Figure 1. Master Schedule Chart - Phases III, IV, and V

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DETAIL WORK PLAN Section	WORK STATEMENT ITEM	PHASE III RFP Section
1.01	Engine Design	2.01 and 3.02
1.02	Fabrication and Assembly	2.01 and 2.02
1.03	Tooling	2.01
1.04	Engine Instrumentation	2.03
1.05	Test Equipment	2.04
1.06	Engine Test-Ground	2.05
1.07	Engine Performance	3.01
1.08	Inlet System Compatibility	1.10
1.09	Noise	1.11
1.10	Growth Potential	3.03
1.11	Fan and Compressor	1.01
1.12	Primary Combustor	1.02
1.13	Turbine	1.03
1.14	Augmentor	1.04
1.15	Exhaust System	1.05
1.16	Controls and Accessories	1.06
1.17	Lubricant, Lubrication System, Bearings, Seals, and Gears	1.07 and 1.09
1.18	Fuels	1.08
1.19	Manufacturing Techniques and Materials	3.04
1.20	Weight Control and Status	3.05
2.01	Coordination	1.13
2.02	Maintainability and Human Engineering	4.01 and 4.07
2.03	Reliability	4.02

Figure 2. Cross-Reference Index (Sheet 1 of 2)

DETAIL WORK PLAN Section	WORK STATEMENT ITEM	PHASE III RFP Section
2.04	Quality Assurance	4.03
2.05	Value Engineering	4.04
2.06	Configuration Management	4.05
2.07	Safety	4.06
2.08	Test Planning and Integration	4.08
2.09	Data Management	6.01
2.10	Program Management and Controls	6.02
2.11	Facilities Plan	6.03
2.12	Cost Analyses	6.04
2.13	Proposals	6.0
3.01	Ground, Taxi, and Flight Test Engines	2.06 and 2.08
3.02	Tooling	2.01
3.03	Engine Performance	3.01
3.04	Engine Mock-up	1.12
3.05	Spares	5.03
3.06	Overhaul	5.0
3.07	Engine Test and Evaluation - Flight	2.06, 2.07, 2.08
3.08	Data and Handbooks	5.01
3.09	Training and Training Equipment	5.02
3.10	Ground Support Equipment	5.04

Figure 2. Cross-Reference Index (Sheet 2 of 2)

We have included in the following pages brief cost narratives that provide additional data and information in substantiation of our cost estimates. Each major function is defined,and the estimating methods employed are explained. The Phase III cost was estimated in terms of current (escalated) dollars and the cost for Phases IV and V are in 1967 dollars, as requested in the Request for Proposal. The estimates reflect the current results of our continuing comprehensive study to improve manufacturing techniques which will enable significant cost reductions to be effected while maintaining the high quality standards required. Some of the specific areas where improved techniques have been or are expected to be accomplished are discussed in the cost narratives.

The basis for the application of fee credit is shown in the draft contract included in this proposal and is consistent with the Federal Aviation Agency's Financial Plan for Phase III. The Format A cost figures indicate the estimate of the total cost of the Phases independent of any application of fee credit.

No major subcontracting effort is anticipated during the engine program, in the sense that development or design effort would be subcontracted. The subcontracting of major sections of a program is more typical of airframe programs. It is planned, however, that certain engine controls will be procured from suppliers who are established specialists in this field. These and other outside purchases are handled by the Purchasing Department. Vendor selections are usually based upon our evaluation of multiple fixed-price competitive quotations with the significant criteria being price, quality, and delivery. The description of our purchasing methods is included in the Subcontracting Plan, Volume V, and specific details are available for analysis and evaluation.

Overtime premium is estimated for Phases III, IV, and V representing three percent of direct labor dollars. The overtime premium amounts are shown separately in the estimate as required. We have found that it is inevitable in large programs that some overtime will be required to cope with emergencies, overcome sporadic manufacturing bottlenecks, and conduct certain tests and processes of a continuous nature. The usage of overtime under these circumstances frequently results in lower over-all program costs.

For cost estimating purposes, we have assumed that Phase IV covers the JTF17 engine program from September 15, 1969, through May 15, 1974, and includes engine certification on December 31, 1971, fourteen prototype and eighteen production engine overhauls, concluding with Aircraft Certification on May 15, 1974. Phases III and IV overlap through the one-year period commencing September 15, 1969, during which the Phase IV effort will consist of long lead-time hardware procurement and advance development effort not associated with the Phase III support of the airframe manufacturer's 100-hour flight test program. The Phase IV Work breakdown Structure is the same as that for Phase III with the exception of items completed during Phase III.

Phase V is the production phase which covers the period through completion of delivery of 1,200 JTF17 engines on June 1, 1979, and

includes the attendant Post Aircraft Certification Sustaining Engineering effort subsequent to the completion of Phase IV. As with other major programs, it is planned that the engines will be produced at Pratt & Whitney Aircraft's East Hartford, Connecticut facilities, and that the Post Aircraft Certification Sustaining Engineering effort will be accomplished by the Florida Research and Development Center. It is anticipated that the facilities to be used for the production engines in Phase V will be company-owned so that there is no need to provide for rental of Government-owned facilities at the Connecticut Operations. We estimate that rental charges for use of Government-owned facilities during the Phase V Sustaining Engineering effort at the Florida Research and Development Center will be $6,600,000. This amount has not been included in the estimated cost for Phase V Sustaining Engineering effort.

A copy of the current three-year labor union contract effective January 1966 was forwarded to the Federal Aviation Agency Contract Administrator by our letter of August 23, 1966.

The historical information on Pratt & Whitney Aircraft's past experience of cost performance on Government aircraft engine delivery contracts was previously submitted to the Federal Aviation Agency in the Management Volume dated January 15, 1965. Additional information is included in Section IX, Volume V of this proposal entitled "Company Competence."

The estimating format is compatible with the requirements of our accounting system and provides a basis for effective cost control and reporting. Additionally, there is extensive detailed backup data supporting the estimates available at the Florida Research and Development Center for evaluation by Government representatives.

SECTION II
ENGINE WORK BREAKDOWN STRUCTURE

LEVEL I	LEVEL II	LEVEL III
JTF17 ENGINE	1.0 Engine and Component Development	1.01 Engine Design 1.02 Fabrication and Assembly 1.03 Tooling 1.04 Engine Instrumentation 1.05 Test Equipment 1.06 Engine Test-Ground 1.07 Engine Performance 1.08 Inlet System Compatibility 1.09 Noise 1.10 Growth Potential 1.11 Fan and Compressor 1.12 Primary Combustor 1.13 Turbine 1.14 Augmentor 1.15 Exhaust System 1.16 Controls and Accessories 1.17 Lubricant, Lubrication System, Bearings, Seals, and Gears 1.18 Fuels 1.19 Manufacturing Techniques and Materials 1.20 Weight Control and Status
	2.0 Management Controls and Product Assurance	2.01 Coordination 2.02 Maintainability and Human Engineering 2.03 Reliability 2.04 Quality Assurance 2.05 Value Engineering 2.06 Configuration Management 2.07 Safety 2.08 Test Planning and Integration 2.09 Data Management 2.10 Program Management and Controls 2.11 Facilities Plan 2.12 Cost Analyses 2.13 Proposals
	3.0 Delivery and Product Support	3.01 Ground, Taxi, and Flight Test Engines 3.02 Tooling 3.03 Engine Performance 3.04 Engine Mockup 3.05 Spares 3.06 Overhaul 3.07 Engine Test and Evaluation-Flight 3.08 Data and Handbooks 3.09 Training and Training Equipment 3.10 Ground Support Equipment

SECTION III
COST NARRATIVES

The following narratives provide the analysis of the estimating details used as a basis for the anticipated costs in each activity code. This summary is not intended to be a detailed substantiation, but rather an outline of the estimating technique and general methodology used in calculating the direct cost estimates. Supporting calculations, schedules, charts, and historical details utilized are readily available for review by Government representatives.

1. DESIGN ENGINEERING (CODE 01)

a. General

Under the direction of Project Engineering, Design Engineering is responsible for the first step in reducing complete propulsion system concepts to practice. The Design function is to convert basic powerplant schemes, performance parameters, and theoretical data to working designs that can be fabricated into hardware. The designers are responsible for the complete engineering definition of the hardware involved. They must (1) select the best materials available for every part, (2) ensure that all designs lend themselves to the latest production methods, and (3) design all parts for maximum reliability to ensure dependable service under extreme flight conditions, minimum weight and cost, and ease of maintenance. Mechanical designers translate all of these requirements into design layouts, consulting as required with the Analytical Design personnel for aid in specialized fields such as combustion, heat transfer, and stress analysis.

Analytical Designers develop advanced analytical methods to provide more rapid and exact solutions to complex problems. They work in conjunction with Mechanical Design in the development of a propulsion system. Analytical Designers also initiate structural, chemical, and physical tests to establish design criteria for future engines.

Consultations are also held between Mechanical Design and Design Metallurgy to determine the best materials available to satisfy design requirements of strength, formability, and joining. After the completed design layout has been approved by the Chief Design Engineer and the Program Manager, the layout is transmitted to the Drafting Department.

Based on the approved layout, the design is broken down into its components and each part is then drawn in detail by the Drafting Department. Drawings prepared may be machined details, castings, forgings, weldments, or assembly drawings. Drafting also prepares experimental releases and engineering changes.

All contractual reports, as well as presentations and summary reports, are processed by the Reports function of the Design Department. Upon receiving a requirement for a report, the technical matter is written and coordinated with illustrations for the necessary pictorial representation. Writing of the technical portion of the report ranges from the generation of technical copy from conferences with technical personnel and analysis

of test data to copy editing for consistency of format and grammar. Illustration preparation ranges from simple curves to complex art drawings, such as cutaway of an engine.

b. Mechanical Design

The Mechanical Design function is used as a base for estimates requiring Design Department participation since the initiation of work within the Design Department is performed by this group in the form of the Design layout. The other design functions support this effort or are dependent upon it, e.g., Analytical Design provides analytical support to the Mechanical Designer, details are made from the layouts, parts lists, and releases of drawings are prepared from the details and layouts. Engineering changes are prepared as required from new or revised layouts and details.

c. Basis of Estimate

(1) Design Manpower Estimate

The Phase III Florida Design manpower estimate is based on our most recent Phase II-C experience from 1 July 1965 through July 1966.

This history shows the following Design areas of effort as a factor of Mechanical Design:

Area	Phase II-C History	Phase II-C Factor	Adjusted for Comparable History
Mechanical Design	137,116	1.000	1.000
Analytical Design	165,895	1.210	1.210
Drafting	195,514	1.426	1.800
Records	22,813	0.166	0.450
Reports	18,278	0.133	0.133
Computing Laboratory	38,128	0.278	0.278
Materials Development Laboratory	5,934	0.043	0.043
Others	6,651	0.049	0.049
Total	590,329	4.305	4.963

It is anticipated, based on other related history, that both the Drafting and Records Section ratios will be slightly higher than our experience on Phase II-C demonstrator engine design. This will increase the total multiplying factor to 4.963:1.

Phase II-C Design history to date indicates an average of 49,000 hours per month expended at the Florida Research and Development Center with an additional 6,215 hours per month of East Hartford support. The mechanical design portion of this effort amounted to approximately 12,400 hours per month or 77 equivalent people.

It is estimated that a continuation of this level will be required in Mechanical Design through the first two years of Phase III.

Using the adjusted factor of 4.963, the total initial design personnel becomes 382 people. This level is estimated to continue for the first two years and then to decrease 10% each year through 1970.

(2) Design Materials Estimate

Three major categories comprise the direct materials content of the design estimate:

1. Materials Development Laboratory - Charges cover such items as materials used for parts failure analysis, material properties tests; and test fixtures for special design-requested MDL tests. We have estimated that Phase II-C experience to date (approximately $25,000/year) is representative of the average to be anticipated throughout Phase III, although effort required of MDL will be approximately 50% higher in the first year than the average for total Phase III. As a result, it is estimated that 1967 costs will be $35,900 and will decline to approximately $18,000 by 1969.

2. Computing Laboratory - Computing charges are estimated to be a logical continuation of Phase II-C experience to date with slight reductions due to heat transfer and compressor-turbine work having been accomplished. Approximately 811 computing hours were expended in twelve months of Phase II-C. It is estimated that 793 hours will be required in each of the first two years of Phase III with decreases thereafter in line with the decline in design effort.

3. Reports - Based on Phase II-C experience to date, as well as the data list requirements for Phase III, it is estimated that costs for reports (per year) will be:

Phase III Reports	$54,000
12 Special Reports	6,000
15 Minute Movie a Year	15,000
Total	$75,000

2. FABRICATION-CONSTRUCTION (CODE 02)

a. General

Our experience in the fabrication of development and prototype parts for the J58 engine, which used high temperature materials similar to those to be used in the JTF17 engine, has been applied extensively in preparation of our cost estimates for the JTF17 engine program. Some of the areas where our J58 experience has been extremely helpful in preparing our cost estimates are shown below. Discussion of specific construction (manufacturing) costs as estimated by Work Statement items follows this section.

(1) Raw Material Processing

Pratt & Whitney Aircraft Metallurgists have worked with forging vendors on altering their processes in order to improve their products and in a number of cases have developed a potential for significant cost reductions. Refined specifications have resulted in improved reproducibility with attendant reductions in scrap rates at the raw material producers' plants and in Pratt & Whitney Aircraft's fabricating departments. Similarly, processing improvements and improved metallurgical quality have been achieved working with casting vendors and mills producing bar and sheet stock.

(2) Manufacturing Techniques

Pratt & Whitney Aircraft has accumulated considerable knowledge through experience in the processing of high nickel age-hardening alloys. Part costs of high nickel weldments have been continually decreased through the use of more closely controlled materials, better detail part fit-up, and improved welding and heat-treating techniques.

The machining of high nickel and high cobalt alloys have been improved through the development of special drills, reamers, end mills and cutters and the extensive use of Electrical Discharge Machining.

Manufacturing methods used in producing high quality aircraft engine tube assemblies have been improved tremendously. The need for the building of a master tube has been eliminated completely. New resistance brazing techniques have been developed permitting bench brazing of details on wooden fixtures. Tube assembly output per manhour has increased by 300% in the past few years.

A process for producing tube assemblies with integral end fittings has been developed to eliminate brazed joints in high pressure lines. Manufacturing costs of tube assemblies thus produced have been reduced considerably since implementation of the process.

Wide use has been made of protective atmosphere heat treat retorts with sand seals in place of welded flanges. A 200% labor saving in the retort loading and unloading has resulted. Where welded flanges must be used, a new design now effects significant savings.

Considerable use has been made of reinforced plastic spray-up techniques for the fabrication of mockup engine components. Cost reductions have been accomplished by the use of expanded cylindrical paper for making mockup tube assemblies.

Electron beam welding is now being used to enable the fusing of materials not capable of being jointed by conventional welding methods and for cost reduction on traditional applications. Weld shrinkage is reduced and therefore tooling simplified. Electron beam welding techniques have been developed for the acceptable repair of parts and tools which might otherwise be scrapped.

Wide use of Electrical Discharge Machining techniques have not only permitted the manufacture of parts not previously producible but have resulted in major savings in labor compared to more conventional methods, such as milling. The use of Electro Chemical Machining, especially in roughing operations on the super alloys, has reduced labor costs and simplified tooling. Electro Chemical grinding has permitted the manufacture of thin walled engine parts to close tolerances, again with reduced tooling costs.

Epoxy dies are being used in producing sheet metal details by explosive forming. These dies are considerably cheaper than Kirksite or steel dies. Coating processes have been continually improved to afford manufacturing economies while maintaining high quality.

(3) New Structures and Material Changes

Intensive studies have resulted in the simplification of some of the previously estimated most costly elements of the SST engine. These studies will continue through design release and parts manufacture. A few examples are:

1. The redesign of the main engine burner to incorporate mechanical assembly where possible, eliminating many costly resistance welding operations
2. Simplification of the intermediate case to allow bolting of the inner portion (towershaft and bearing support) in place, rather than welding; and the fabrication of sheet metal struts in place of fully machining these details
3. Redesign of the nozzle support case is planned to reduce size and complexity of details, tooling cost, and to provide superior manufacturing techniques.

Material changes from previous supersonic engine designs, permissible because of the different operating conditions, may reduce parts cost up to 40%. An outstanding example of this is the use of Inco 718 in place of Waspaloy. Additionally, the use of A-110AT Titanium alloy in some stator assemblies will appreciably lower labor costs.

b. Specific Work Breakdown Structure

The following narratives relate to the specific work breakdown structure items as noted.

(1) Engine and Component Development

A JTF17A-21 development engine Bill-of-Material listing dated 4 August 1966 was used as the basis for construction (manufacturing) material and labor estimates. (This Bill-of-Material is available for review, but is not included as an exhibit in the interests of brevity.) The bill was priced using the latest actual Phase II-C procurement experience. Existing purchase order numbers are referenced for raw material, finished parts, and proprietary parts. Engineering estimates were applied where necessary for anticipated JTF17A-21 engine design, material specification and configuration changes. The base engine cost was then adjusted to allow for

anticipated reductions in cost throughout the development program due to gradual refining of tooling for prototype engines, which will be running concurrently, as well as for continuing Value Engineering and design efforts on high value parts initially procured with a short lead time at premium costs.

Total component rig requirements were estimated based on a relationship between the individual rig and the corresponding section of the engine. The first-build schedule and anticipated rig retirement dates enable time phasing of component rig costs. In addition, available Phase II-C rigs, with suitable modifications as required, were utilized in arriving at the total estimate.

The development base engine cost was multiplied by the total equivalent engine requirements to support 15 active engines, based upon recent comparable experience. Fabrication direct labor factors, based on an analysis of Phase II-C and similar program histories, were applied to cover shop support and service department support labor functions. These factors account for shop rework for incorporation of engineering changes, shop support of assembly operations, process planning labor, scheduling and expediting labor, project materials control, and other miscellaneous salary labor departments.

In order to attain Level III detail distribution of support hardware costs, usage ratios were applied to evaluate the usage of support hardware by type of rig application. This weighted usage is based upon engineering judgment as to the relative vulnerability of various engine parts, and upon anticipated part life and rate of replacement.

(2) Delivery and Product Support

(a) Ground, Taxi, and Flight Test Engines

The JTF17A-21 ground test, taxi test, and flight test prototype engine costs were developed from the development engine Bill of Material. Base engine costs were adjusted for anticipated changes in the make-buy relationship, due to shop loading for the development program effort during this same period. The prototype base engine cost was multiplied by the requirements for delivery of 20 engines with appropriate lead time necessary to inspect, assemble, and ship the engines on schedule.

Replacement parts, required to be available for immediate replacement on an engine during assembly or test to permit timely delivery of the engine, were estimated at a total value of one-half of an equivalent engine. (This amounts to 2.5% of equivalent engine parts for each of 20 engines.)

(b) Engine Mockup

Three full-scale JTF17A-21 engine installation mockups were estimated for delivery to airframe manufacturers. Construction material and labor estimates are based on actual mockup cost history from the Phase II-C demonstrator program.

(c) Spares

Previous experience showed that an amount equal to 20% of the engine price was required for each overhaul and an additional 10% was required for each field maintenance period. These historical ratios were used for the JTF17A-21 engine program estimate. (These costs were allocated to Codes 02, 04, and 06 based on engineering judgment and experience.)

(d) Overhaul

Construction material for the overhaul of 20 prototype engines and 18 production engines at FRDC is supplied as spare parts (included in paragraph (c) above).

Construction labor involves shop hourly labor in support of the assembly operations and salary labor for Material Control, Planning, and Expediting. Shop labor was estimated at 500 hours per engine, with shop rework on parts from Assembly estimated at 20% of Assembly labor. Service department labor (planning, expediting, project material control) was based on a constant level of effort during the period of overhaul activities amounting to 10 people.

3. TEST (CODE 03)

Test operations involve a wide range of individual activities geared to the basic function of installing and operating engines and/or components in the test facilities.

The major categories of personnel involved are the stand crews (test conductors), maintenance and support personnel, and instrumentation engineers and technicians.

a. Test Manpower

The manpower estimates for these efforts were developed as follows.

(1) Engines

Test stand requirements, expressed in stand shift months (one stand completely manned and supported for one shift for one month), were developed from the test plan, which indicates stand availability, programed engine run time, and the test conditions required (which determines the split of testing between "A" area (sea level) and "C" area (altitude) engine test stands). Other considerations in developing the estimated stand shift months were (1) planned improvements in the new stands, (2) checkout of the new stands, and (3) estimated improved efficiency due to increased amount of testing. The estimate of required stand shift months is as follows:

Year	"A" Area (A-3, A-4, A-5, A-9)	"C" Area (C-4, C-6, C-8, C-9, C-10)
1967	36 Stand Shift Months	30 Stand Shift Months
1968	48 Stand Shift Months	48 Stand Shift Months
1969	54 Stand Shift Months	66 Stand Shift Months
1970	60 Stand Shift Months	78 Stand Shift Months

The stand shift months were converted to estimated labor hours by the following methods:

1. Determine total stand crew hours required per shift month. (Number of men in stand crew times 160 hours.)
2. Eliminate historical percentage of stand-by stand crew total hours charged to overhead.
3. Eliminate historical percentage of direct stand crew hours not directly allocable to specific engine test work orders.
4. Add the factor for direct support charged by test departments.

Resultant yearly estimates:

Year	"A" Area (A-3,A-4,A-5,A-9)		"C" Area (C-4,C-6,C-8,C-9,C-10)		Total
	Shift-Months	Manhours	Shift-Months	Manhours	Manhours
1967	36	69,768	30	95,670	165,438
1968	48	93,024	48	153,072	246,096
1969	54	104,652	66	210,474	315,126
1970	60	116,280	78	248,742	365,022

This level of effort is estimated to be sustained through 1973 as a result of improved efficiencies in operation and longer life of parts even through total run times are planned to increase. (Table indicates full year 1970 although Phase III ends in September.)

(2) Engine Instrumentation

The test labor hours for this effort, which is described in the test plan, were estimated at 8% of the total test labor hours required for engine and component testing, based on comparable history.

(3) Component Testing

Large component testing such as compressor, turbine, augmentor, and combustor estimates were based upon related experience indicating labor hours per run hour for type of component and stand to be used as delineated in the test plan.

(a) Fan and Compressor Testing

Testing will be done on Stands C-3 and C-7 and is based on Phase II-C and other related experience.

Year	Manhours
1967	37,800
1968	100,800
1969	105,000
1970	92,400

(b) Turbine Testing

Turbine testing will involve four stands, A-11, A-3, B-2, and C-1A. Manpower estimates based on Phase II-C and other related experience are as follows:

Year	Manhours
1967	53,400
1968	83,040
1969	54,940
1970	29,470

Details of these calculations are available for review.

(c) Augmentor Testing

Augmentor testing will involve three stands, B-2, C-2, and C-4. Manpower estimates based on Phase II-C and other related experience are as follows:

Year	Manhours
1967	50,424
1968	33,040
1969	22,460
1970	22,000

(d) Combustor Testing

Combustor testing involves three stands, C-1, A-11, and DM-41. Manpower estimates were based on related experience as follows:

Year	Manhours
1967	30,624
1968	46,474
1969	36,024
1970	36,024

Details of these calculations are available for review.

(e) Controls

The testing for controls was based on planned stand utilization. (Utilization of a stand for a one-year period, two shifts, equals 3840 hours.) Stand D-7 and D-21 has a two-man crew. All others are one-man operations. Historically, support functions account for an additional 90% of the base direct manhours.

Year	Manhours
1967	26,996
1968	82,152
1969	109,951
1970	124,469

Details of these calculations are available for review.

(f) Bearings, Seals and Gearboxes

Testing involves five stands, D-1, D-3, D-4, D-24, and D-31. Manpower estimates based on related stand utilization history is as follows:

Year	Manhours
1967	50,868
1968	84,780
1969	63,588
1970	59,349

(g) Noise

Testing will be accomplished on Stand D-32 with an estimate of 50% utilization and 90% support for a one-man operation on each of two shifts. Total estimate is 3648 manhours per year.

(4) Prototype Engines

Test labor required for prototype engines is based on the number of test labor hours per run hour. Test manhours per run hour (121) were extended by the run hours per engine (22.2), based on previous experience, to account for total test labor per prototype engine.

(5) Overhaul Test Effort

The estimated amount of test labor per overhaul is based on one-half of the testing time for one prototype engine (due to the elimination of the green run requirement on overhauled engines).

b. Test Material

Based on related historical experience, a factor of $2.25 per hour will be required for test material.

Additional test material items not contained in the test material factor are as follows:

1. Fuel and Lube - Estimated at $635 per hour of engine running time (using an estimated 5900 gallons of fuel at the latest purchase order price, plus $10 per hour for lube oil).

2. Computer Rental - Based on related history, the rental is allocated at $295 per computer hour.

3. Engine Testing at Willgoos Laboratory, Connecticut - This testing is estimated to cost $4500 per hour for the first 100 hours and $4000 per hour for subsequent hours, for a total of 520 planned run hours.

4. Reverser-Suppressor Testing at Tullahoma - This effort is estimated to cost $288,000 based on a quote received for a previously planned program.

5. 6/10-Scale Compressor Fan Rig Testing (East Hartford) - This effort is estimated to cost $1,134,000 based on an analysis of history experienced in Phase II-C at our East Hartford facility.

6. Wind Tunnel Ejector Testing at UAC Research Laboratory - This effort is estimated to cost $30,000 per month for the years 1967, 1968, and 1969 and $15,000 per month for the years 1970, 1971, and 1972.

4. QUALITY ASSURANCE (CODE 04)

a. Manpower for Development Phase

Quality Assurance labor during development includes primary labor for the inspection of procured and shop fabricated development hardware, and also includes labor requested for reinspection during teardown and rebuild of the active development engines.

The manpower estimate for the JTF17A-21 development program is based on recent comparable experience of 11,236 hours per equivalent engine set of parts.

An additional 4125 hours for reinspection per active engine will also be required.

The required development program Quality Assurance manpower through 1970 is illustrated in the following table:

Year	Active Engines	Equivalent Engine	Primary Labor at 11,236 Hours per Equivalent Engine	Reinspection Labor at 4125 Hours per Active Engine	Total Labor Hours
1967	4.5	11	123,596	18,563	142,159
1968	7.5	12	134,832	30,938	165,770
1969	11.4	12	134,832	47,025	181,857
1970	12.0	12	134,832	49,500	184,332

b. Material

Quality Assurance material cost sources are expected to be similar to recent comparable development experience. Historically, the sources of these material charges have been: charges representing expenditures for services performed by vendors as an assist to the Material Control Laboratory, IBM rental charges for miscellaneous machine calculations and reports, and Expense Requisitions for miscellaneous material drawn from the Master Crib.

Recent history has indicated that the cost of this type of material cost bears a ratio of 13.8% to quality labor cost. This ratio was used in the development cost estimate.

c. Prototype Manpower

Pratt & Whitney Aircraft practice is to provide total inspection of material parts, assemblies, engine assembly, component and engine test. Any significant nonconformance of part or assembly characteristics requires Quality review disposition. Test nonconformances require Engineering evaluation and disposition. We have used 12,000 hours for inspection per prototype engine.

d. Prototype Quality Material

As a result of development effort absorbing a majority of the services performed in assistance to the Materials Development Laboratory, the quality material requirements for prototype engines are estimated to amount to only $2750 per engine (a ratio of 6.4% material to labor as contrasted to the 13.8% used on the development estimate).

e. Overhaul Manpower and Material

This estimate of direct labor provides for teardown inspection, assembly rebuild inspection, and test inspection. It will also provide for intermediate inspection between teardown and rebuild as directed by Engineering Memo or Delivery Order Supplement. This will include visual and dimensional inspection for damage or wear, nondestructive testing of major rotating and highly stressed parts, and specification checking of engine components.

Manpower is based on an estimate of 2000 hours per overhaul which is consistent with comparable recent experiences.

5. TOOLING (CODE 05)

a. Engine and Component Development

(1) Manufacturing Tooling

Total JTF17A-21 tooling material and labor requirements were computed as a percentage of construction material and labor. An analysis of related history and one year's history from the JTF17A-20 demonstrator engine program were used to develop the tooling percentage applicable to each calendar year. Initial tooling estimated to be required in 1967 reflects a percentage which decreases each year throughout Phase III development.

The first half year of Phase II-C experience amounted to approximately 18% tooling costs as a function of construction material and labor. After one year, this percentage dropped to 14.8%. As a result, it is estimated that the first year of Phase III will average 12% of construction material and labor as tooling costs. The percentage for each year of Phase III is estimated to follow this trend:

1967	1968	1969	1970
12%	9%	7.5%	6%

Total tooling was distributed as 80% material and 20% labor. This also is supported by our historical tooling analysis.

b. Delivery and Product Support

(1) Prototype Tooling

Prototype tooling is required to provide additional capacity to fabricate, inspect, and assemble ground test, taxi test, and flight test prototype engines. Development tools will be used to the fullest extent possible. A separate assembly area must be tooled to assemble the prototype engines. Also inspection gages and some alterations to existing development tooling will be required to inspect the higher volume of prototype parts.

The prototype tooling requirement was estimated at 48% of the development tooling ratio of 7.5% for Phases III and IV, or 0.48 (7.5) = 3.6%. This was derived by weighting various categories of tools according to anticipated requirements.

Total tooling was then allocated as 80% material and 20% labor based on comparable history.

(2) Overhaul

Tooling for the overhaul program is required for maintenance and repair of existing prototype tools. An engineering estimate of $2500 material and 300 hours labor per month was used throughout a 48 month period of overhaul activity.

(3) Ground Support Equipment

The ground support equipment estimate was based on recent comparable history and our engineering review of the JTF17A-21 Supersonic Aircraft Engine Program requirements. A detailed list of comparable equipment on which this cost estimate was based is available for review.

6. ASSEMBLY (CODE 06)

a. Engine and Component Development

Total assembly labor requirements were based on an analysis of a recent comparable period selected as being representative of Phase III development. This period closely parallels the planned JTF17A-21 effort in its relationship to the number of active test engines and component test rigs, the equivalent engine months of engine and component testing, and the number of engine and component rig builds and rebuilds.

Assembly labor history indicates that as the number of active test engines and associated rig testing increases, the number of equivalent assembly people required to support each active engine decreases. This decrease is the result of the following:

(1) Learning

1. Accumulated experience and familiarity with the parts
2. Correction of early interference problems
3. Reduced rework on rebuilds, necessary on initial build to obtain stackup tolerances
4. Improved tooling and assembly techniques.

(2) Manpower Distribution

Component rig effort initially is a greater portion of total assembly effort. This rig effort remains fairly constant throughout engine development but since the number of active engines increases, the rig ratio decreases.

(3) Design Improvements

1. Compatibility of replacement parts
2. Effective maintainability provides more efficient methods of mating subassemblies
3. Accessibility improvements (replacement of vulnerable parts through partial rebuilds).

(4) Hardware Development

1. Increased part life decreases the rate of replacement
2. Longer periods at test between rebuilds
3. Decrease in complete teardown with increased use of partial or section rebuilds.

The number of active engines required for the JTF17A-21 engine development program was multiplied by the estimated number of equivalent people required to support the assembly effort for each year as determined by previous experience.

Assembly labor was distributed between engine and component requirements in proportion to their respective equivalent months of testing. Initial component rig build estimates were prepared for the various rigs required for Phase III development. The remaining component assembly labor was distributed in proportion to planned rig rebuilds. Details of the calculations for assembly labor are available for review.

b. Delivery and Product Support

(1) Ground, Taxi, and Flight Test Engines

Assembly of prototype engines will be accomplished in an area separate from development assembly.

Prototype engine assembly involves initial build assembly, initial test support, post-test disassembly and reassembly, final test support, and packaging and shipment.

Four ground test engines, four taxi test engines, and 12 JTF17A-21 prototype engines were estimated for a total of 20 prototype delivery engines. An engineering estimate of 8000 hours of hourly labor per engine was used based on actual JTF17A-20 assembly experience. Salary labor (general foremen, foremen, engineering change technicians, and clerk typists) were estimated to be 216 man months of effort (12 men x 18 months), or 1728 hours per engine.

Prototype assembly labor was time phased in accordance with the planned delivery schedule, and is estimated to amount to an equivalent 3.5 engines in 1968 and 16.5 engines in 1969.

c. Engine Mockup

Assembly labor is required to assemble three full-scale JTF17A-21 engine installation mockups for airframe manufacturers. Estimates were based on actual mockup history from the Phase II-C demonstrator program.

d. Overhaul

Overhaul assembly labor is required for disassembly, reassembly, final test, packaging and shipping of 38 overhaul engines. Estimates were prepared on the basis of a constant level of effort for hourly and salary people and were time-phased in accordance with the planned overhaul schedule. Hourly estimates amount to 5280 hours per engine (including penalty rebuilds). Salary personnel planned for full time include 2 foremen and 2 engineering change technicians for 48 months of activity.

7. ENGINEERING (CODE 08)

a. Development, Program Controls, and Product Assurance

Historically, the effort performed by these groups has been directly related to the number of active engines in a development program. During the initial stages of a program, the engineering effort has been traditionally at a higher rate per active engine than at the program peak of active engines. Consequently, the peak of Phase III engineering effort is estimated to occur early in 1970, although the number of active engines will be at a maximum in 1972. The estimated average number of active engines, by calendar year, and the related number of equivalent project engineers required for the JTF17A-21 development program, is summarized in the following table.

Year	Average Active Engines	Engineers per Active Engine	Total Equivalent Engineers
1967	4.5	50	225
1968	7.5	33	250
1969	11.4	25	275
1970	12.0	25	300

The Engineering labor estimate is further based in total on the assumption that the JTF17A-21 will be developed through engine certification with approximately the same amount of effort as required for an equivalent purpose during a comparable period at the Florida Research and Development Center.

The following sections were combined for estimating purposes due to their inherent functional relationships.

1. Engineering and Supporting Departments
2. Performance, Reliability, and Computing

(1) Engineering and Supporting Departments

Department	Job Function
Engineering	Basic program management; to initiate design, procurement and modification of parts; to direct fabrication, assembly and testing of all hardware; to maintain accurate engineering records.
Materials Development Laboratory	Perform all material development and test analyses.
Photography	Perform all photographic work required by Engineering for reports and analyses.
Miscellaneous	All other departments not specifically outlined which are called upon to perform a specific task as may be required by Engineering.

(2) Performance and Computing Departments

Department	Job Function
Performance and Reliability	Maintain reliability and statistics records; prepare and direct specific analyses as required by Engineering; perform and direct test data analyses.
Computing	Maintain and prepare all required computer programs and decks needed to perform analyses and test data reduction as required by performance.

To arrive at the total estimated manhours performed by the various groups included in Items 1 and 2 above, historical ratios were derived from representative history. These ratios indicated that 74.28% of total engineering effort was applicable to Group (1) and 25.72% to Group (2).

Further breakdown of the Engineering hours estimate for the two groups to the Work Breakdown structure was obtained by ratios derived from detailed Engineering records, as well as by judgment factors.

b. Prototype Engines and Product Support

The Engineering portion of the prototype engine effort of 50,080 hours is based on an estimate of the equivalent Project Engineering positions required, and the tasks to be performed related to the schedule.

These equivalent positions for Project Engineering are an estimate of the manpower required for preparation for delivery. This consists of initial procurement requirements, follow-up and incorporation of design and engineering changes, expediting parts through fabrication and inspection, assembly of components and controls, directing tests of engines prior to delivery and maintaining adequate records. Field Engineering and Performance Analysis functions constitute the Product Support effort for Code 08 and amount to 21,220 hours in Phase III.

Computing, Photography, and overtime manhours, along with Computer material dollars, were based on the same factors as used in the development effort estimate. It is estimated that the effort required will be in essentially the same related proportions as those associated with the development program.

c. Development Material

The following paragraphs are the descriptions of four basic Engineering material classifications and explanations of how they were estimated:

(1) Computer

Computing charges are based on the approved rate of $295 per hour for an anticipated number of IBM 7090 hours, consistent with related engineering ratios for performance, reliability, and engineering statistics.

(2) Materials Development Laboratory Material Dollars

These are the material dollars charged for material used by the Materials Development Laboratory (MDL) in running tests and analyses required by Engineering. The estimate was derived from an historical factor of material dollars per MDL manhour.

(3) East Hartford Engineering

During the development of the JTF17A-21 engine, it is expected that some engineering assistance will be obtained from Pratt & Whitney Aircraft at East Hartford. It is estimated that from seven to twelve East Hartford engineers will be used to assist in performance and system analysis, noise studies and analysis, computer studies on controls, consultation on fuel and lubrication, and a liaison engineer for hardware parts. Although these costs will vary from month to month, we estimate that they will average $20,000 per month through engine certification.

(4) Vendor Development of Controls and Pumps

The development work on controls and pumps performed at vendors' plants is included in engineering material. This work will be subcontracted on the basis of competitive quotes on a fixed-price basis and are estimated at this time on the basis of the best quotes available for this stage of definition. Hardware costs of controls and pumps are part of the Fabrication-Construction (Code 02) cost estimates.

8. ESCALATION OF COSTS

The following comments are in response to the requirement stated in page 5A-18, paragraph 2.2 of the Request for Proposal:

a. Development Escalation (Florida Research and Development Center)

(1) Labor

Escalation rates, approved by the Defense Contract Audit Agency, are detailed by Cost Code in Section VII of this Cost Report as support data to Format D.

(2) Material

A historical factor of approximately 1.5% escalation per year has been used in the estimating of development material costs. This escalation does not show in the Format A details, but rather, has been considered as a weighting factor in the cost improvement judgment applied to material items.

b. Production Escalation (Phase V - East Hartford)

(1) Labor

Escalation through 1967 (which is the basis for Phase V cost estimate) is indicated in Section VII of this Cost Report as support data to Format D.

(2) Material

Production material escalation is estimated to amount to 2% per year. It is not shown as a detail in the production engine cost estimate data, but was considered as an offsetting cost increase factor in the 94% material improvement (learning) factor.

SUMMARY FORMAT A
PHASE III
(DOLLAR AMOUNTS ARE IN THOUSANDS)

Level I			Delivery and Product Support	JTF17A-21 Development	Total
I	ENGINEERING				
	Direct Labor	Hrs.	71,300	3,996,470	4,067,770
	Direct Labor	Amt.	$ 378	$ 19,812	$ 20,190
	Overhead	"	414	21,856	22,270
	Subcontracted Effort	"		7,991	7,991
	Overtime Premium	"	12	594	606
	Materials	"		1,830	1,830
	Other Direct Charges	"	22	1,230	1,252
	TOTAL ENGINEERING	"	$ 826	$ 53,313	$ 54,139
II	TESTING				
	Direct Labor	Hrs.	61,782	2,515,882	2,577,664
	Direct Labor	Amt.	$ 252	$ 10,118	$ 10,370
	Overhead	"	274	11,215	11,489
	Subcontracted Effort	"			
	Overtime Premium	"	8	303	311
	Materials	"	463	20,178	20,641
	Other Direct Charges	"	18	396	414
	TOTAL TESTING	"	$ 1,015	$ 42,210	$ 43,225
III	TOOLING				
	Direct Labor	Hrs.	80,161	377,614	457,775
	Direct Labor	Amt.	$ 311	$ 1,451	$ 1,762
	Overhead	"	337	1,600	1,937
	Subcontracted Effort	"			
	Overtime Premium	"	9	44	53
	Materials	"	1,800	5,803	7,603
	Other Direct Charges	"			
	TOTAL TOOLING	"	$ 2,457	$ 8,898	$ 11,355
IV	FABRICATION-CONSTRUCTION				
	Direct Labor	Hrs.	1,070,028	2,723,893	3,793,921
	Direct Labor	Amt.	$ 4,021	$ 10,156	$ 14,177
	Overhead	"	4,364	$ 11,208	$ 15,572
	Subcontracted Effort	"			
	Overtime Premium	"	121	304	425
	Materials	"	41,774	70,432	112,206
	Other Direct Charges	"			
	TOTAL FABRICATION-CONST	"	$ 50,280	$ 92,100	$ 142,380
V	QUALITY CONTROL				
	Direct Labor	Hrs.	280,362	575,572	855,934
	Direct Labor	Amt.	$ 1,008	$ 2,061	$ 3,069
	Overhead	"	1,095	2,278	3,373
	Subcontracted Effort	"			
	Overtime Premium	"	30	62	92
	Materials	"	69	283	352
	Other Direct Charges	"			
	TOTAL QUALITY CONTROL	"	$ 2,202	$ 4,684	$ 6,886
VI	OTHER EFFORT-ASSEMBLY				
	Direct Labor	Hrs	439,707	1,111,648	1,551,155
	Direct Labor	Amt.	$ 1,704	$ 4,207	$ 5,911
	Overhead	"	1,287	4,664	5,951
	Subcontracted Effort	"			
	Overtime Premium	"	51	126	177
	Materials	"			
	Other Direct Charges	"	36		36
	TOTAL OTHER E.FORT-ASSY	"	$ 3,078	$ 8,997	$ 12,075
	TOTAL DIRECT COST		$ 59,858	$ 210,202	$ 270,060
VII	GEN'L & ADMIN EXPENSE		6,161	15,866	20,027
	TOTAL COST		$ 63,599	$ 226,068	$ 290,087

VIII LABOR AND OVERHEAD RATES

Refer to Section VI, Format D (Labor Rates) and Section IX (Overhead Rates).

SUMMARY FORMAT A
PHASE III
(DOLLAR AMOUNTS ARE IN THOUSANDS)

Level II		1.0 Engine and Component Development	2.0 Management Controls and Product Assurance	3.0 Delivery and Product Support	Total
I ENGINEERING					
Direct Labor	Hrs.	3,494,864	501,606	71,300	4,067,770
Direct Labor	Amt.	$ 17,308	$ 2,504	$ 378	$ 20,190
Overhead	"	19,088	2,768	414	22,270
Subcontracted Effort	"	7,991			7,991
Overtime Premium	"	519	75	12	606
Materials	"	1,555	275		1,830
Other Direct Charges	"	1,135	95	22	1,252
TOTAL ENGINEERING	"	$ 47,596	$ 5,717	$ 826	$ 54,139
II TESTING					
Direct Labor	Hrs.	2,515,562	320	61,782	2,577,664
Direct Labor	Amt.	$ 10,117	$ 1	$ 252	$ 10,370
Overhead	"	11,213	2	274	11,489
Subcontracted Effort	"				
Overtime Premium	"	303		8	311
Materials	"	20,178		463	20,641
Other Direct Charges	"	396		18	414
TOTAL TESTING	"	$ 42,207	$ 3	$ 1,015	$ 43,225
III TOOLING					
Direct Labor	Hrs.	377,614		80,161	457,775
Direct Labor	Amt.	$ 1,451		$ 311	$ 1,762
Overhead	"	1,600		337	1,937
Subcontracted Effort	"				
Overtime Premium	"	44		9	53
Materials	"	5,803		1,800	7,603
Other Direct Charges	"				
TOTAL TOOLING	"	$ 8,898		$ 2,457	$ 11,355
IV FABRICATION-CONSTRUCTION					
Direct Labor	Hrs.	2,722,453	1,460	1,070,028	3,793,921
Direct Labor	Amt.	$ 10,150	$ 6	$ 4,021	$ 14,177
Overhead	"	11,202	6	4,364	15,572
Subcontracted Effort	"				
Overtime Premium	"	304		121	425
Materials	"	70,432		41,274	112,206
Other Direct Charges	"				
TOTAL FABRICATION-CONST	"	$ 92,088	$ 12	$ 50,280	$ 142,380
V QUALITY CONTROL					
Direct Labor	Hrs.	574,283	1,289	280,362	855,934
Direct Labor	Amt.	$ 2,956	$ 5	$ 1,008	$ 3,969
Overhead	"	2,273	5	1,093	3,373
Subcontracted Effort	"				
Overtime Premium	"	62		30	92
Materials	"	283		69	352
Other Direct Charges	"				
TOTAL QUALITY CONTROL	"	$ 5,574	$ 10	$ 2,202	$ 7,886
VI OTHER EFFORT-ASSEMBLY					
Direct Labor	Hrs.	1,111,448		439,707	1,551,155
Direct Labor	Amt.	$ 7,207		$ 1,704	$ 8,911
Overhead	"	6,464		1,287	7,751
Subcontracted Effort	"				
Overtime Premium	"	126		31	157
Materials	"				
Other Direct Charges	"			36	36
TOTAL OTHER EFFORT-ASSY	"	$ 8,997		$ 3,078	$ 12,075
TOTAL DIRECT COST		$ 204,460	$ 5,742	$ 59,858	$ 270,060
VII G&A & ADMIN EXPENSE		13,456	412	4,161	18,029
TOTAL COST		$ 217,916	$ 6,154	$ 64,019	$ 288,089

SUMMARY FORMAT A
PHASE III
(DOLLAR AMOUNTS ARE IN THOUSANDS)

Level II Item 1.0 Engine and Component Development (Breakdown by Fiscal Years)		Fiscal Year 1967	1968	1969	1970	1971	Total
I ENGINEERING							
Direct Labor	Hrs.	508,033	1,049,025	1,064,317	790,103	83,386	3,494,864
Direct Labor	Amt.	$ 2,376	$ 5,018	$ 5,320	$ 4,140	$ 454	$ 17,308
Overhead	"	2,660	5,512	5,752	4,634	530	19,088
Subcontracted Effort	"	1,598	3,995	1,678	640	80	7,991
Overtime Premium	"	71	151	100	124	13	519
Materials	"	207	428	429	416	75	1,555
Other Direct Charges	"	163	332	333	266	41	1,135
TOTAL ENGINEERING	"	$ 7,075	$ 15,436	$ 13,672	$10,220	$ 1,193	$ 47,596
II TESTING							
Direct Labor	Hrs.	191,675	621,659	754,697	782,631	164,900	2,515,562
Direct Labor	Amt.	$ 730	$ 2,415	$ 3,027	$ 3,249	$ 696	$ 10,117
Overhead	"	818	2,646	3,272	3,664	813	11,213
Subcontracted Effort	"						
Overtime Premium	"	22	72	91	97	21	303
Materials	"	3,734	5,640	5,192	4,673	939	20,178
Other Direct Charges	"	18	77	120	148	33	396
TOTAL TESTING	"	$ 5,322	$ 10,850	$ 11,702	$11,831	$ 2,502	$ 42,207
III TOOLING							
Direct Labor	Hrs.	64,758	134,994	104,290	64,319	9,253	377,614
Direct Labor	Amt.	$ 244	$ 512	$ 404	$ 254	$ 37	$ 1,451
Overhead	"	273	564	437	283	43	1,600
Subcontracted Effort	"						
Overtime Premium	"	7	16	12	8	1	44
Materials	"	1,249	1,785	1,735	982	52	5,803
Other Direct Charges	"						
TOTAL TOOLING	"	$ 1,773	$ 2,877	$ 2,588	$ 1,527	$ 133	$ 8,898
IV FABRICATION-CONSTRUCTION							
Direct Labor	Hrs.	344,278	826,470	82 ,250	620,598	103,557	2,722,453
Direct Labor	Amt.	$ 1,729	$ 3,000	$ 3,107	$ 2,405	$ 409	$ 10,150
Overhead	"	1,376	3,298	3,358	2,693	479	11,202
Subcontracted Effort	"						
Overtime Premium	"	37	90	93	72	12	304
Materials	"	9,807	20,506	21,197	17,474	1,248	70,432
Other Direct Charges	"						
TOTAL FABRICATION-CONST	"	$12,449	$ 26,892	$ 27,955	$22,644	$ 2,148	$ 92,088
V QUALITY CONTROL							
Direct Labor	Hrs.	64,476	160,095	174,953	147,810	26,949	574,283
Direct Labor	Amt.	$ 224	$ 562	$ 628	$ 542	$ 100	$ 2,056
Overhead	"	251	617	680	608	117	2,273
Subcontracted Effort	"						
Overtime Premium	"	7	17	19	16	3	62
Materials	"	30	74	86	75	14	283
Other Direct Charges	"						
TOTAL QUALITY CONTROL	"	$ 512	$ 1,274	$ 1,413	$ 1 241	$ 234	$ 4,674
VI OTHER EFFORT-ASSEMBLY							
Direct Labor	Hrs.	122,580	2 ,980	321,528	354,462	64,898	1,111,448
Direct Labor	Amt.	$ 438	$ 992	$ 1 218	$ 1,389	$ 260	$ 4,297
Overhead	"	490	992	1,317	1,562	303	4,664
Subcontracted Effort	"						
Overtime Premium	"	13	2	36	42	8	126
Materials	"						
Other Direct Charges	"						
TOTAL OTHER EFFORT-ASSY	"	$ 941	$ 1,421	$ 2,571	$ 2,993	$ 571	$ 8,997
TOTAL DIRECT COST		$28,072	$ 59,250	$ 59,901	$50,456	$ 6,781	$ 204,460
VII GEN'L & ADMIN EXPENSE		2,630	6,867	6,122	5,628	537	15,456
TOTAL COST		$30,702	$ 66,117	$ 66,023	$56,134	$ 7,318	$ 219,916

SUMMARY FORMAT A
PHASE III
(DOLLAR AMOUNTS ARE IN THOUSANDS)

Level II Item 2.0 Management Controls and Product Assurance (Breakdown by Fiscal Year)

			FISCAL YEAR					
			1967	1968	1969	1970	1971	Total
I	ENGINEERING							
	Direct Labor	Hrs.	68,928	139,776	145,334	125,162	22,406	501,606
	Direct Labor	Amt.	$ 325	$ 674	$ 731	$ 654	$ 120	$ 2,504
	Overhead	"	364	740	790	734	140	2,768
	Subcontracted Effort	"						
	Overtime Premium	"	10	20	22	20	3	75
	Materials	"	37	75	75	75	13	275
	Other Direct Charges	"	13	25	25	26	6	95
	TOTAL ENGINEERING	"	$ 749	$ 1,534	$ 1,643	$ 1,509	$ 282	$ 5,717
II	TESTING							
	Direct Labor	Hrs.			320			320
	Direct Labor	Amt.			$ 1			$ 1
	Overhead	"			2			2
	Subcontracted Effort	"						
	Overtime Premium	"						
	Materials	"						
	Other Direct Charges	"						
	TOTAL TESTING	"			$ 3			$ 3
IV	FABRICATION-CONSTRUCTION							
	Direct Labor	Hrs.			1,440			1,440
	Direct Labor	Amt.			$ 6			$ 6
	Overhead	"			6			6
	Subcontracted Effort	"						
	Overtime Premium	"						
	Materials	"						
	Other Direct Charges	"						
	TOTAL FABRICATION-CONST	"			$ 12			$ 12
V	QUALITY CONTROL							
	Direct Labor	Hrs.	149	324	446	348	22	1,289
	Direct Labor	Amt.	$ 1	$ 1	$ 2	$ 1	$	$ 5
	Overhead	"	1	1	2	1		5
	Subcontracted Effort	"						
	Overtime Premium	"						
	Materials	"						
	Other Direct Charges	"						
	TOTAL QUALITY CONTROL	"	$ 2	$ 2	$ 4	$ 2	$	$ 10
	TOTAL DIRECT COST		$ 751	$ 1,536	$ 1,662	$ 1,511	$ 282	$ 5,742
VII	GEN'L & ADMIN EXPENSE		64	121	115	110	22	432
	TOTAL COST		$ 815	$ 1,657	$ 1,777	$ 1,621	$ 304	$ 6,174

SUMMARY FORMAT A
PHASE III
(DOLLAR AMOUNTS ARE IN THOUSANDS)

Level II Item 3.0 Delivery and Product Support (Breakdown by Fiscal Year)

			FISCAL YEAR				
		1967	1968	1969	1970	1971	Total
I ENGINEERING							
Direct Labor	Hrs.		4,000	34,335	29,605	3,360	71,300
Direct Labor	Amt.		$ 20	$ 180	$ 159	$ 19	$ 378
Overhead	"		22	194	176	22	414
Subcontracted Effort	"						
Overtime Premium	"		1	6	5		12
Materials	"						
Other Direct Charges	"		1	4	14	3	22
TOTAL ENGINEERING	"		$ 44	$ 384	$ 354	$ 44	$ 826
II TESTING							
Direct Labor	Hrs.			25,521	36,261		61,782
Direct Labor	Amt.			$ 103	$ 149		$ 252
Overhead	"			112	162		274
Subcontracted Effort	"						
Overtime Premium	"			3	5		8
Materials	"			191	272		463
Other Direct Charges	"			8	10		18
TOTAL TESTING	"			$ 417	$ 598		$ 1,015
III TOOLING							
Direct Labor	Hrs.		22,320	41,003	16,838		80,161
Direct Labor	Amt.		$ 86	$ 159	$ 66		$ 311
Overhead	"		92	172	73		337
Subcontracted Effort	"						
Overtime Premium	"		3	4	2		9
Materials	"		707	865	228		1,800
Other Direct Charges	"						
TOTAL TOOLING	"		$ 888	$ 1,200	$ 369		$ 2,457
IV FABRICATION-CONSTRUCTION							
Direct Labor	Hrs.	2,000	239,867	613,532	214,629		1,070,028
Direct Labor	Amt.	$ 7	$ 882	$ 2,306	$ 826		$ 4,021
Overhead	"	8	955	2,493	908		4,364
Subcontracted Effort	"						
Overtime Premium	"		27	69	25		121
Materials	"	73	9,038	28,551	4,112		41,774
Other Direct Charges	"						
TOTAL FABRICATION-CONST	"	$ 88	$10,902	$33,419	$ 5,871		$ 50,280
V QUALITY CONTROL							
Direct Labor	Hrs.	45	62,210	151,368	66,739		280,362
Direct Labor	Amt.		$ 220	$ 544	$ 244		$ 1,008
Overhead	"		238	588	269		1,095
Subcontracted Effort	"						
Overtime Premium	"		7	16	7		30
Materials	"		13	44	12		69
Other Direct Charges	"						
TOTAL QUALITY CONTROL	"		$ 478	$ 1,192	$ 532		$ 2,202
VI OTHER EFFORT-ASSEMBLY							
Direct Labor	Hrs.	1,153	5,765	151,405	256,008	25,376	439,707
Direct Labor	Amt.	$ 4	$ 21	$ 579	$ 999	$ 101	$ 1,704
Overhead	"	5	23	527	701	31	1,287
Subcontracted Effort	"						
Overtime Premium	"		1	17	30	3	51
Materials	"						
Other Direct Charges	"			36			36
TOTAL OTHER EFFORT-ASSY	"	$ 9	$ 45	$ 1,159	$ 1,730	$ 135	$ 3,078
TOTAL DIRECT COST		$ 97	$12,357	$37,771	$ 9,454	$ 179	$ 59,858
VII GEN'L & ADMIN EXPENSE		9	906	2,606	616	4	4,141
TOTAL COST		$ 106	$13,263	$40,377	$10,070	$ 183	$ 63,999

SUMMARY FORMAT A
PHASE III
(DOLLAR AMOUNTS ARE IN THOUS

Level III Breakdown of Level II Item 1.0 Engine and Component Development		1.01 Engine Design	1.02 Fabrication	1.03 Tooling	1.04 Engine Instrumentation	1.05 Test Equipment	1.06 Engine Test Ground	1.07 Engine Performance	1.08 Inlet System Compat-ibility	1.09 Noise
I ENGINEERING										
Direct Labor	Hrs.	1,606,774	153,065		40,208		181,791	97,497	68,366	55,732
Direct Labor	Amt.	$ 7,679	$ 796		$ 201		$ 950	$ 510	$ 346	$ 282
Overhead	"	8,449	880		222		1,056	564	382	312
Subcontracted Effort	"									
Overtime Premium	"	230	24		6		29	15	10	8
Materials	"	79	276		6		745		1	
Other Direct Charges	"	588			15			124	62	53
TOTAL ENGINEERING	"	$ 17,025	$ 1,976		$ 450		$ 2,780	$ 1,213	$ 801	$ 655
II TESTING										
Direct Labor	Hrs.				186,338		985,461			13,530
Direct Labor	Amt.				$ 749	$	$ 3,978			$ 54
Overhead	"				831		4,421			60
Subcontracted Effort	"									
Overtime Premium	"				23		119			2
Materials	"				419	5,981	8,413			30
Other Direct Charges	"						268			
TOTAL TESTING	"				$ 2,022	$ 5,981	$17,199			$ 146
III TOOLING										
Direct Labor	Hrs.			377,614						
Direct Labor	Amt.			$ 1,451						
Overhead	"			1,600						
Subcontracted Effort	"									
Overtime Premium	"			44						
Materials	"			5,803						
Other Direct Charges	"									
TOTAL TOOLING	"			$ 8,898						
IV FABRICATION-CONSTRUCTION										
Direct Labor	Hrs.		2,115,843							
Direct Labor	Amt.		$ 7,915							
Overhead	"		8,725							
Subcontracted Effort	"									
Overtime Premium	"		237							
Materials	"		53,710							
Other Direct Charges	"									
TOTAL FABRICATION-CONST	"		$ 70,587							
V QUALITY CONTROL										
Direct Labor	Hrs.		431,319		8,726		2,923			
Direct Labor	Amt.		$ 1,549		$ 31		$ 10			
Overhead	"		1,709		35		12			
Subcontracted Effort	"									
Overtime Premium	"		46		1					
Materials	"		214		4		1			
Other Direct Charges	"									
TOTAL QUALITY CONTROL	"		$ 3,518		$ 71		$ 29			
VI OTHER EFFORT-ASSEMBLY										
Direct Labor	Hrs.		865,147							
Direct Labor	Amt.		$ 3,282							
Overhead	"		3,641							
Subcontracted Effort	"									
Overtime Premium	"		99							
Materials	"									
Other Direct Charges	"									
TOTAL OTHER EFFORT-ASSY	"		$ 7,022							
TOTAL DIRECT COST		$ 17,025	$ 83,103	$ 8,898	$ 2,543	$ 5,981	$20,002	$ 1,213	$ 801	$ 801
VII GEN'L & ADMIN EXPENSE		1,287	6,188	681	190	482	1,489	90	60	61
TOTAL COST		$ 18,312	$ 89,291	$ 9,579	$ 2,733	$ 6,463	$21,491	$ 1,303	$ 861	$ 862

MARY FORMAT A
PHASE III
UNTS ARE IN THOUSANDS)

System Compatibility	1.09 Noise	1.10 Growth Potential	1.11 Fan and Compressor	1.12 Primary Combustor	1.13 Turbine	1.14 Augmentor	1.15 Exhaust System	1.16 Controls and Accessories	1.17 Lubricants, Lubrication Sys., Bearings, Seals, and Gears	1.18 Fuels	1.19 Manufacturing Techniques and Materials	1.20 Weight Control and Status
366	55,732	38,470	141,244	72,405	127,919	110,593	48,589	458,291	192,883	33,164	25,533	42,340
346	$ 282	$ 188	$ 707	$ 366	$ 649	$ 559	$ 245	$ 2,352	$ 976	$ 169	$ 129	$ 204
382	312	206	781	404	717	618	271	2,596	1,077	186	142	225
								7,991				
10	8	6	21	11	20	17	7	71	29	5	4	6
1			20	18	102	27	1	146	66	38	30	
62	53	18	71	17	21	21	47	54	23	4	4	13
801	$ 655	$ 418	$ 1,600	$ 816	$ 1,509	$ 1,242	$ 571	$13,210	$ 2,171	$ 402	$ 309	$ 448
	13,530		309,112	138,663	212,274	121,522		307,348	241,314			
	$ 54		$ 1,246	$ 554	$ 843	$ 480	$	$ 1,248	$ 965			
	60		1,377	613	927	532		1,386	1,066			
	2		37	17	25	14		37	29			
	30		1,830	312	478	273	1,208	691	543			
			128									
	$ 146		$ 4,618	$ 1,496	$ 2,273	$ 1,299	$ 1,208	$ 3,362	$ 2,603			
			192,229	110,982	192,242	43,733		32,632	34,792			
			$ 703	$ 412	$ 710	$ 163		$ 121	$ 126			
			782	455	786	180		134	140			
			21	12	21	5		4	4			
			7,831	878	4,664	1,204		647	1,498			
			$ 9,337	$ 1,757	$ 6,181	$ 1,552		$ 906	$ 1,768			
			30,806	15,666	43,885	25,580		10,676	4,702			
			$ 110	$ 55	$ 156	$ 90		$ 38	$ 17			
			121	62	173	101		42	18			
			3	2	5	3		1	1			
			15	8	21	13		5	2			
			$ 249	$ 127	$ 355	$ 207		$ 86	$ 38			
			91,030	20,613	32,195	21,003		24,998	56,462			
			$ 341	$ 78	$ 121	$ 79		$ 94	$ 212			
			377	86	133	88		104	235			
			10	2	4	2		3	6			
			$ 728	$ 166	$ 258	$ 169		$ 201	$ 453			
01	$ 801	$ 418	$16,532	$ 4,362	$10,576	$ 4,469	$ 1,779	$17,765	$ 7,033	$ 402	$ 309	$ 448
60	61	32	1,293	331	813	341	134	1,358	537	30	23	34
61	$ 862	$ 450	$17,825	$ 4,693	$11,389	$ 4,810	$ 1,913	$19,123	$ 7,570	$ 432	$ 332	$ 482

SUMMARY FORMAT A
PHASE III
(DOLLAR AMOUNTS ARE IN THOUSANDS)

Level III Breakdown of Level II Item 2.0 Management Controls and Product Assurance		2.01 Coordination	2.02 Maintainability and Human Engineering	2.03 Reliability	2.04 Quality Assurance	2.05 Value Engineering	2.06 Configuration Management	2.07 Safety	2.08 Test Planning and Integration	2.09 Data Management	2.10 Program Management and Controls	2.11 Facilities Plan	2.12 Cost Analysis	2.13 Proposals
I ENGINEERING														
Direct Labor	Hrs.	81,008	37,651	101,824	No Direct	43,046	29,587	30,490	5,376	98,880	47,440	No Direct	16,896	9,406
Direct Labor	Amt.	$ 407	$ 188	$ 519	Cost -	$ 208	$ 146	$ 148	$ 28	$ 482	$ 243	Cost -	$ 87	$ 48
Overhead	"	450	207	574		230	161	163	31	535	269		96	52
Subcontracted Effort	"				Included							Included		
Overtime Premium	"	12	5	16		6	4	5	1	14	7		3	2
Materials	"				In					275		In		
Other Direct Charges	"	50		45										
TOTAL ENGINEERING	"	$ 919	$ 400	$ 1,154	Overhead	$ 444	$ 311	$ 316	$ 60	$1,306	$ 519	Overhead	$ 186	$ 102
II TESTING					Or							Or		
Direct Labor	Hrs.													320
Direct Labor	Amt.				In							In		$ 1
Overhead	"													2
Subcontracted Effort	"				Other							Other		
Overtime Premium	"													
Materials	"				Items							Items		
Other Direct Charges	"													
TOTAL TESTING	"													$ 3
IV FABRICATION-CONSTRUCTION														
Direct Labor	Hrs.													1,440
Direct Labor	Amt.													$ 6
Overhead	"													6
Subcontracted Effort	"													
Overtime Premium	"													
Materials	"													
Other Direct Charges	"													
TOTAL FABRICATION-CONST	"													$ 12
V QUALITY CONTROL														
Direct Labor	Hrs.			242		967								80
Direct Labor	Amt.			$ 1		$ 4								$
Subcontracted Effort	"			1		4								
Overtime Premium	"													
Materials	"													
Other Direct Charges	"													
TOTAL QUALITY CONTROL	"			$ 2		$ 8								$
TOTAL DIRECT COST		$ 919	$ 400	$ 1,156		$ 452	$ 311	$ 316	$ 60	$1,306	$ 519	$	$ 186	$ 117
VII GEN'L & ADMIN EXPENSE		69	30	87		34	24	24	4	99	39		14	8
TOTAL COST		$ 988	$ 430	$ 1,243		$ 486	$ 335	$ 340	$ 64	$1,405	$ 558		$ 200	$ 125

SUMMARY FORMAT A
PHASE III
(DOLLAR AMOUNTS ARE IN THOUSANDS)

Level III Breakdown of Level II Item 3.0 Delivery and Product Support		3.01 Ground, Taxi, and Flight Test Engines	3.02 Tooling	3.03 Engine Performance	3.04 Engine Mock-up	3.05 Spares	3.06 Overhaul	3.07 Engine Test and Evaluation Flight	3.08 Data and Handbooks	3.09 Training and Training Equipment	3.10 Ground Support Equipment
I ENGINEERING											
Direct Labor	Hrs.	50,080		10,020				11,200	No Direct	No Direct	
Direct Labor	Amt.	$ 263		$ 53				$ 62	Cost	Cost *	
Overhead	"	285		58				71			
Subcontracted Effort	"								Included	Included	
Overtime Premium	"	8		2				2			
Materials	"								In	In	
Other Direct Charges	"			10				12			
TOTAL ENGINEERING	"	$ 556		$ 123				$ 147	Overhead	Overhead	
II TESTING											
Direct Labor	Hrs.	53,724					8,058				
Direct Labor	Amt.	$ 218					$ 34				
Overhead	"	236					38				
Subcontracted Effort	"										
Overtime Premium	"	7					1				
Materials	"	403					60				
Other Direct Charges	"	16					2				
TOTAL TESTING	"	$ 880					$ 135				
III TOOLING											
Direct Labor	Hrs.		77,161				3,000				
Direct Labor	Amt.		$ 299				$ 12				$
Overhead	"		323				14				
Subcontracted Effort	"										
Overtime Premium	"		9								
Materials	"		1,196				25				579
Other Direct Charges	"										
TOTAL TOOLING	"		$1,827				$ 51				$ 579
IV FABRICATION-CONSTRUCTION											
Direct Labor	Hrs	949,082			11,547	83,079	26,320				
Direct Labor	Amt.	$ 3,555			$ 42	$ 321	$ 103				
Overhead	"	3,845			46	357	116				
Subcontracted Effort	"										
Overtime Premium	"	107			1	10	3				
Materials	"	37,959			219	3,596					
Other Direct Charges	"										
TOTAL FABRICATION-CONST	"	$45,466			$ 308	$4,284	$ 222				
V QUALITY CONTROL											
Direct Labor	Hrs.	240,000			255	28,107	12,000				
Direct Labor	Amt.	$ 860			$ 1	$ 103	$ 44				
Overhead	"	930			1	114	50				
Subcontracted Effort	"										
Overtime Premium	"	26				3	1				
Materials	"	55				14					
Other Direct Charges	"										
TOTAL QUALITY CONTROL	"	$ 1,871			$ 2	$ 234	$ 95				

SUMMARY FORMAT A (CONTINUED)
PHASE III
(DOLLAR AMOUNTS ARE IN THOUSANDS)

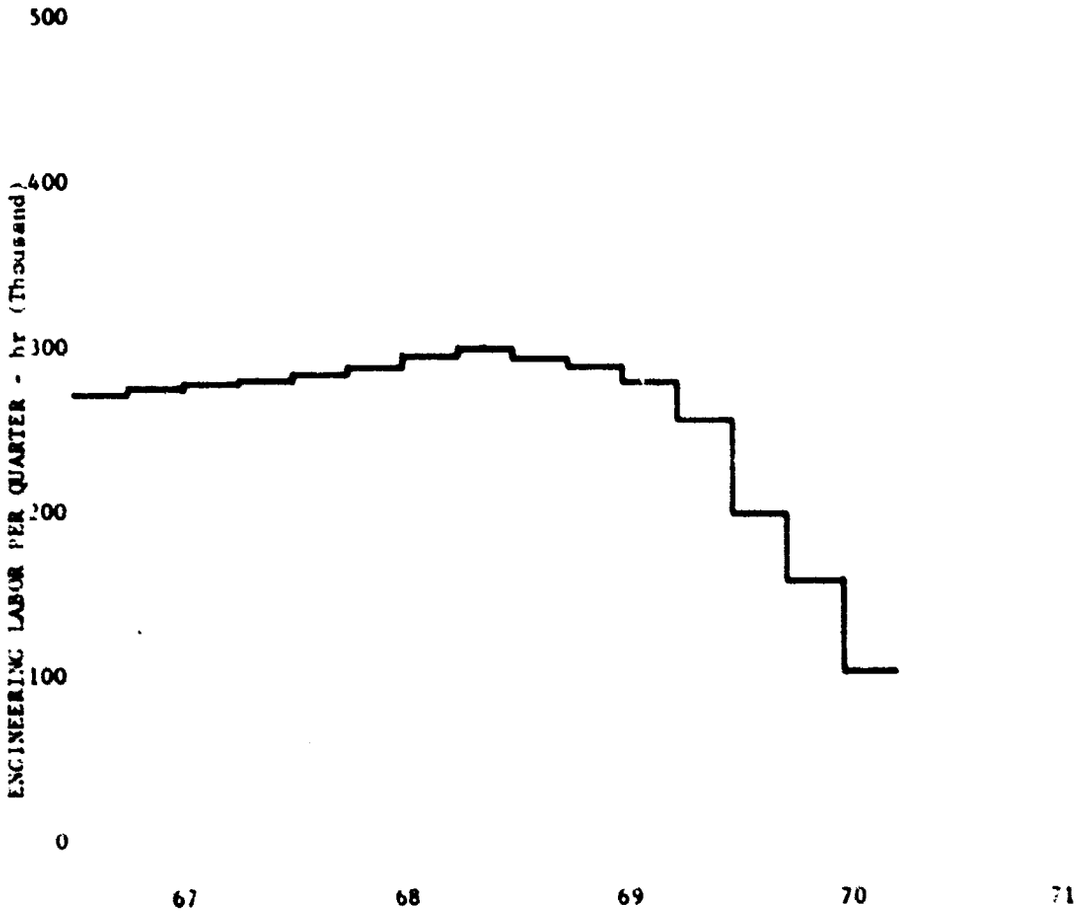
Level III Breakdown of Level II Item 3.0 Delivery and Product Support		3.01 Ground, Taxi, and Flight Test Engines	3.02 Tooling	3.03 Engine Performance	3.04 Engine Mock-up	3.05 Spares	3.06 Overhaul	3.07 Engine Test and Evaluation Flight	3.08 Data and Handbooks	3.09 Training and Training Equipment	3.10 Ground Support Equipment
VI OTHER EFFORT-ASSEMBLY											
Direct Labor	Hrs.	194,560			6,918	16,614	36,600	185,015			
Direct Labor	Amt.	$ 744			$ 25	$ 65	$ 144	$ 726			
Overhead	"	806			28	72	162	219 *			
Subcontracted Effort	"										
Overtime Premium	"	22			1	2	4	22			
Materials	"										
Other Direct Charges	"							36			
TOTAL OTHER EFFORT-ASSY	"	$ 1,572			$ 54	$ 139	$ 310	$1,003			
TOTAL DIRECT COST		$50,345	$1,827	$ 123	$ 364	$4,657	$ 813	$1,150			$ 579
VII GEN'L & ADMIN EXPENSE		3,531	128	8	27	333	60	12 **			42
TOTAL COST		$53,876	$1,955	$ 131	$ 391	$4,990	$ 873	$1,162			$ 621

* The labor shown under Item 3.07, Engine Test and Evaluation-Flight, for the category Other Effort is for assembly personnel in the field to support the 100-hour aircraft flight test program. This effort will be expended at the airframe contractor's plant, flight test site, or other required supporting facilities. These field personnel will bear an estimated 18.4% fringe benefit charge applicable to the direct labor cost and a 10% handling charge on the total of their direct labor and fringe benefits in lieu of the Engineering Overhead.

** The total direct cost shown for Item 3.07, Engine Test and Evaluation-Flight, for the category Other Effort is considered Field Personnel Expense and excluded in the application of the General and Administrative Expense Rate.

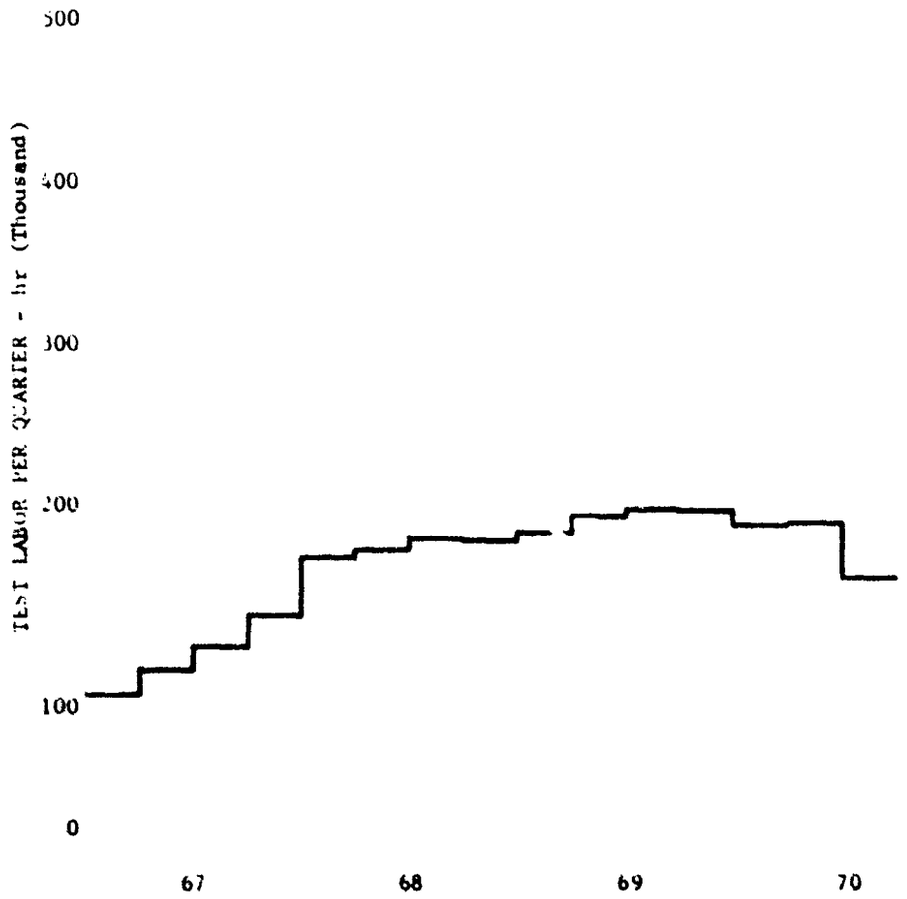
TABULATION FOR FORMAT B
LEVEL I - JTF17A-21 ENGINE
PHASE III
(STRAIGHT TIME HOURS)

Calendar Year	Quarter	Engineering	Test	Tooling	Construction	Quality	Assembly	Total
1967	1	269,819	82,250	24,357	129,492	24,307	57,509	587,734
	2	272,527	97,925	36,516	196,009	36,482	58,800	698,259
	3	275,232	113,575	36,516	204,037	36,479	58,969	724,808
	4	277,940	131,820	38,368	208,230	42,081	57,904	756,343
		1,095,518	425,570	135,757	737,768	139,349	233,182	2,767,144
1968	1	281,962	167,320	36,495	255,269	58,775	60,072	859,893
	2	286,100	171,644	36,495	334,821	71,936	61,576	962,572
	3	293,224	179,286	36,495	331,203	71,855	76,884	988,947
	4	297,430	178,431	36,496	331,204	71,858	90,481	1,005,900
		1,158,716	696,681	145,981	1,252,497	274,424	289,013	3,817,312
1969	1	291,908	182,864	31,651	344,403	80,747	123,102	1,054,675
	2	286,783	193,125	31,932	348,878	82,702	154,089	1,097,509
	3	277,416	196,912	31,191	287,701	71,771	184,892	1,049,883
	4	254,668	196,282	21,956	217,719	53,258	151,998	895,881
		1,110,775	769,183	116,730	1,198,701	288,478	614,081	4,097,948
1970	1	198,990	187,966	12,440	162,739	45,426	115,610	723,171
	2	157,102	188,598	10,700	117,237	31,548	121,344	626,529
	3	102,602	155,006	8,698	97,344	25,353	84,857	473,860
		458,694	531,570	31,838	377,320	102,327	321,811	1,823,560
Total Phase III		3,823,703	2,423,004	430,306	3,566,286	804,578	1,458,087	12,505,964



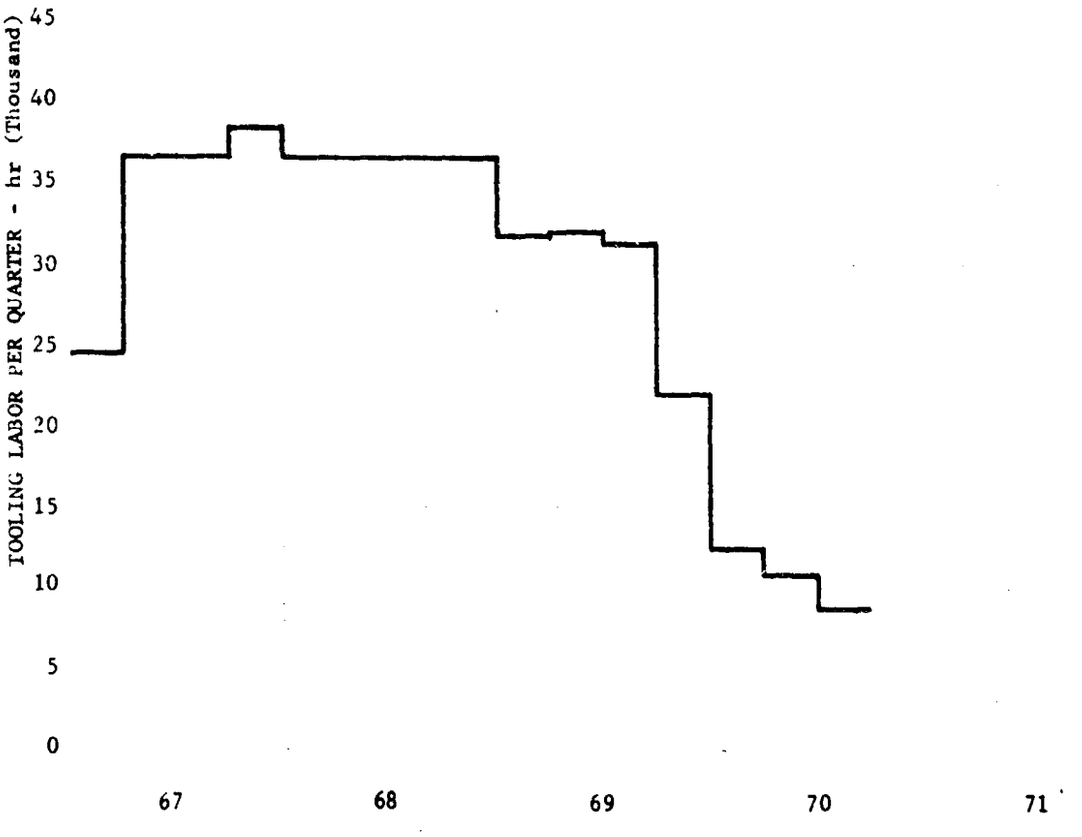
FORMAT B, LEVEL I, PHASE III (ENGINEERING LABOR HOURS)

662508
FD 17669



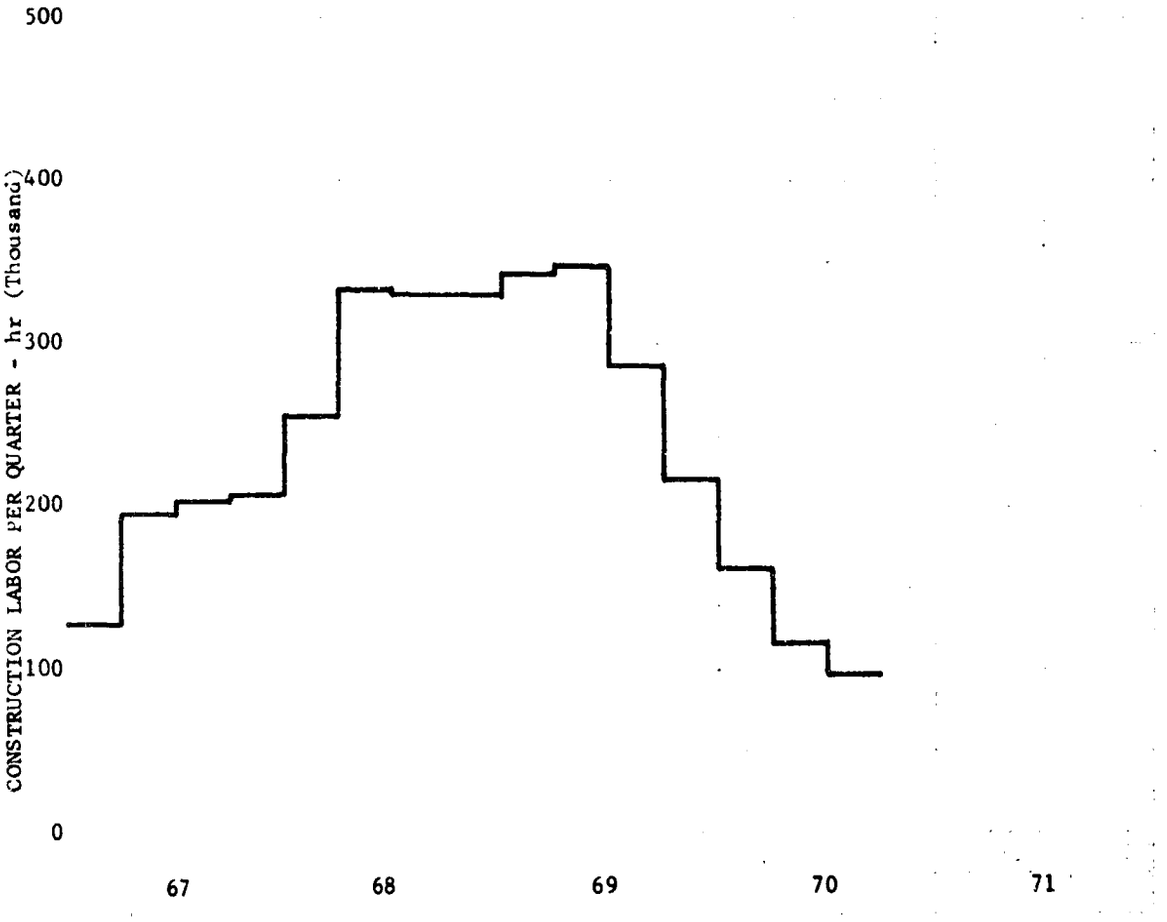
FORMAT b, LEVEL I, PHASE III (TEST LABOR HOURS)

662508
FD 17755



FORMAT B, LEVEL I, PHASE III (TOOLING LABOR HOURS)

662508
FD 17758



FORMAT B, LEVEL I, PHASE III (CONSTRUCTION LABOR HOURS)

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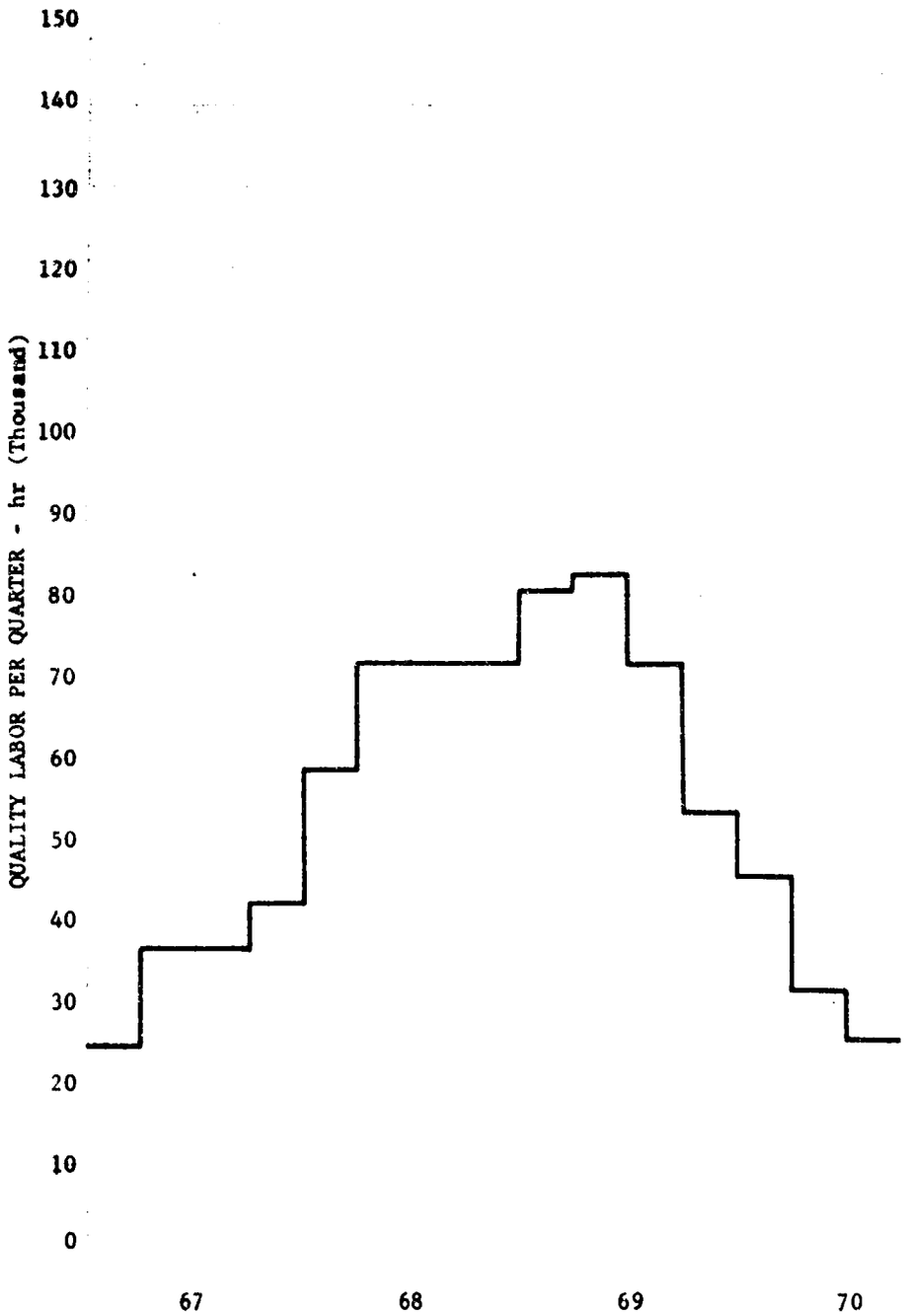
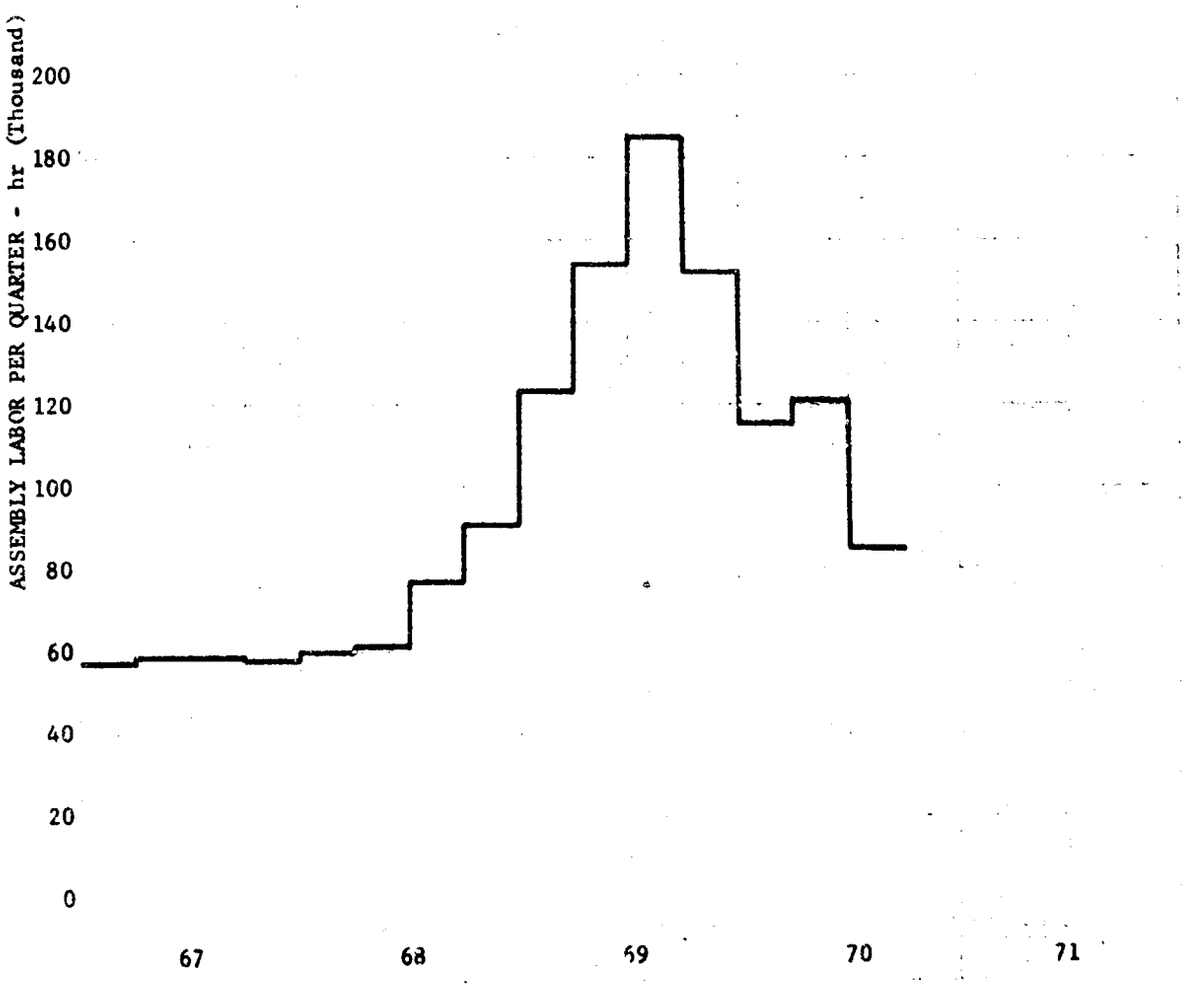
FD 17759



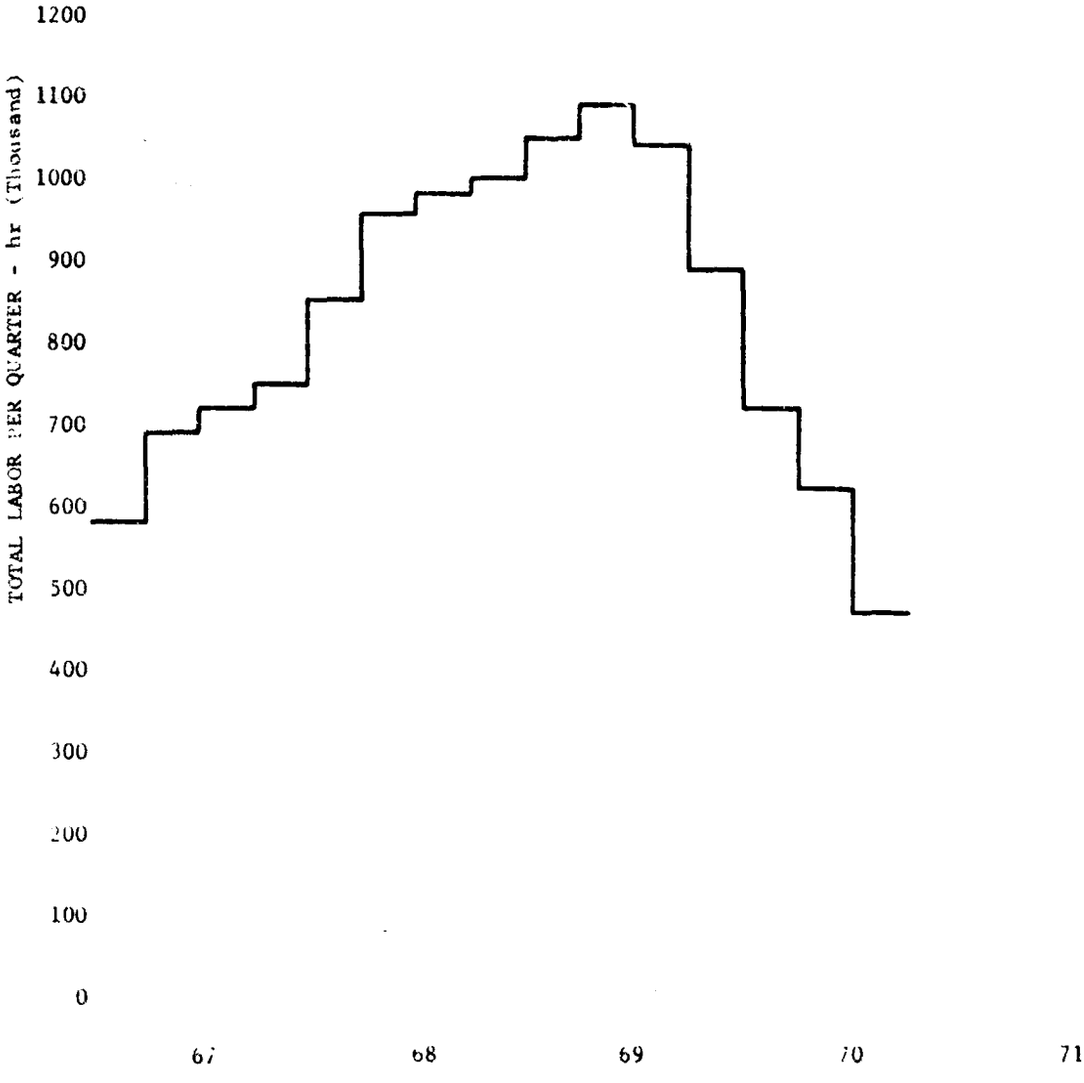
FORMAT B, LEVEL I, PHASE III (QUALITY LABOR HOURS)

662508
FD 17760



FORMAT B, LEVEL I, PHASE III (ASSEMBLY LABOR HOURS)

662508
FD 17761

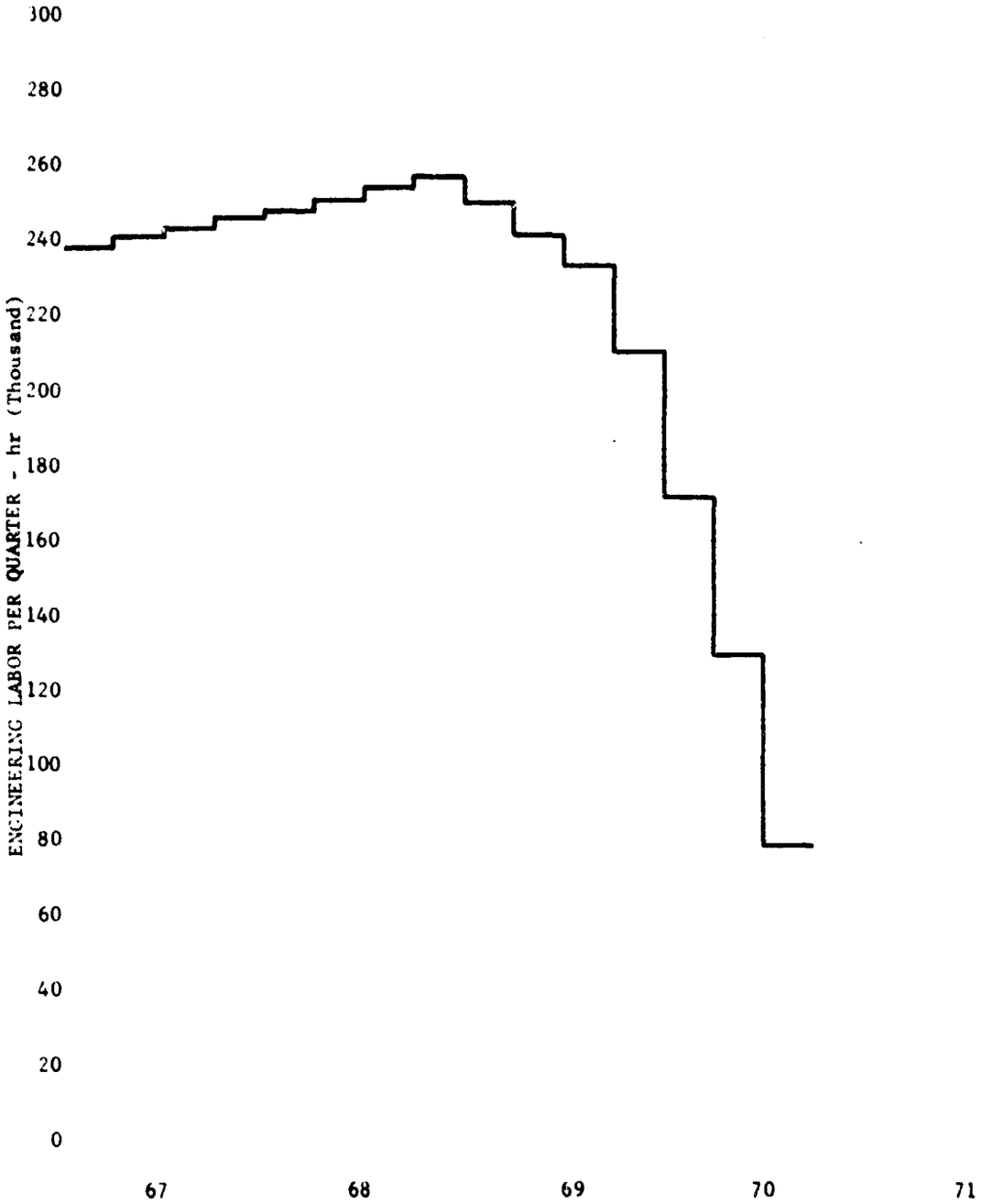


FORMAT B, LEVEL I, PHASE III (TOTAL LABOR HOURS)

662508
FD 17762

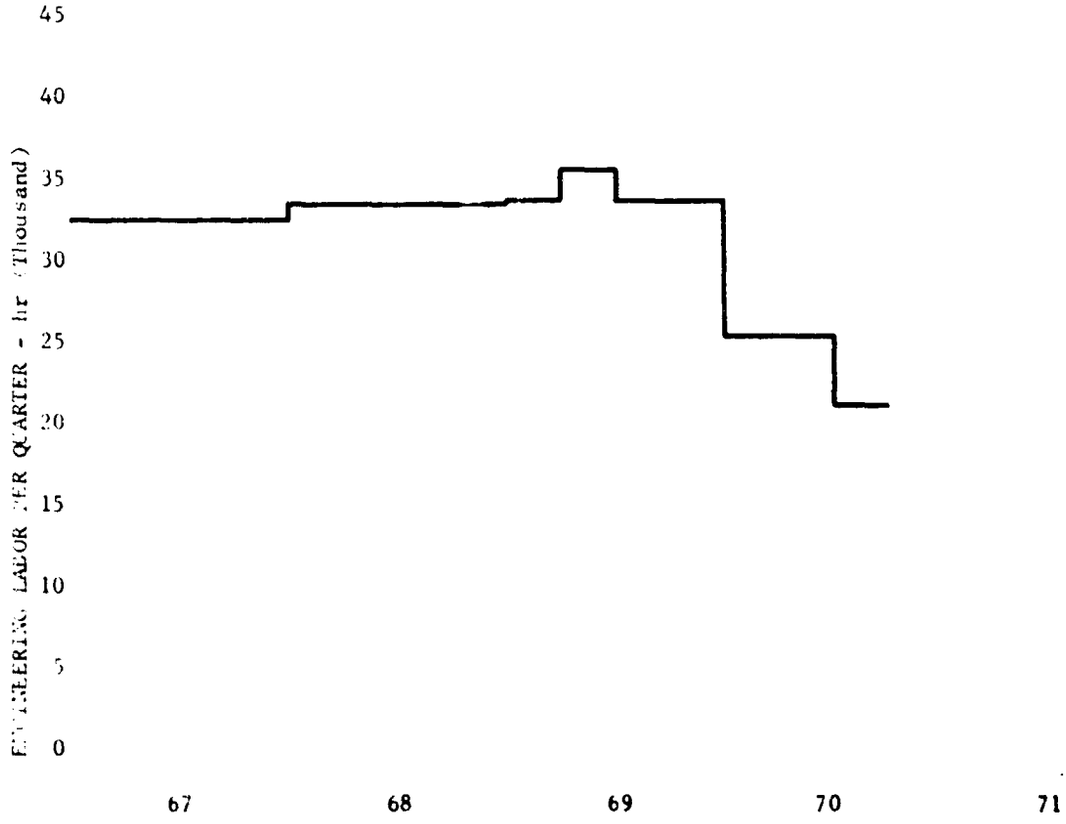
TABULATION FOR FORMAT B
LEVEL II - JTF17A-21 ENGINE
ENGINEERING LABOR HOURS
PHASE III
(STRAIGHT TIME HOURS)

Calendar Year	Quarter	Item 1.0	Item 2.0	Item 3.0	Total
1967	1	237,422	32,397		269,819
	2	240,130	32,397		272,527
	3	242,835	32,397		275,232
	4	245,543	32,397		277,940
		965,930	129,588		1,095,518
1968	1	247,348	33,298	1,316	281,962
	2	250,358	33,298	2,444	286,100
	3	253,362	33,298	6,564	293,224
	4	256,372	33,298	7,760	297,430
		1,007,440	133,192	18,084	1,158,716
1969	1	249,642	33,546	8,720	291,908
	2	241,082	36,470	9,231	286,783
	3	232,806	33,546	11,064	277,416
	4	209,922	33,546	11,200	254,668
		933,452	137,108	40,215	1,110,775
1970	1	171,154	25,279	2,557	198,990
	2	128,815	25,279	3,008	157,102
	3	78,383	21,061	3,158	102,602
		378,352	71,619	8,723	458,694
Total		3,285,174	471,507	67,022	3,823,703



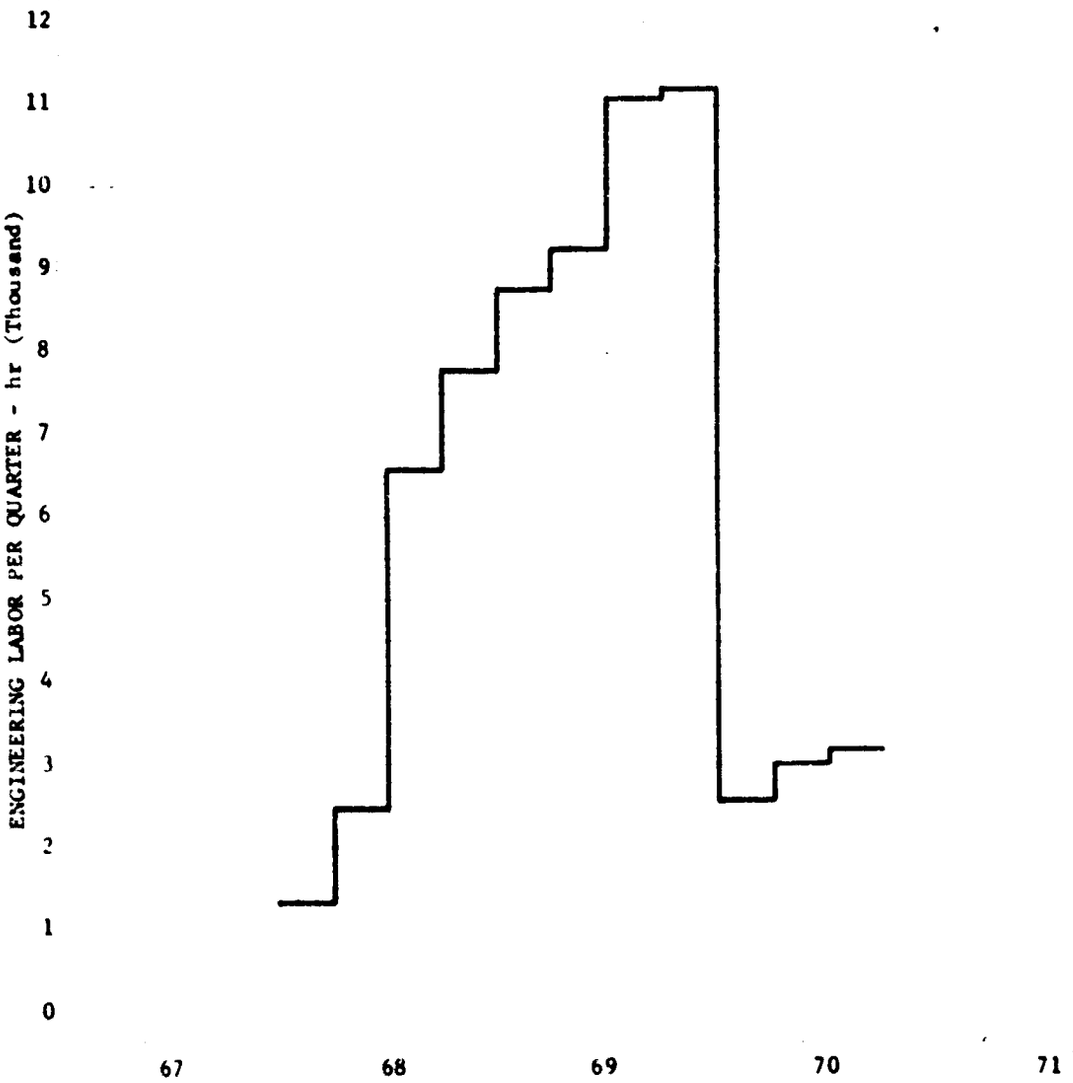
FORMAT B, LEVEL II, PHASE III ENGINEERING LABOR HOURS
(1.0 COMPONENT DEVELOPMENT)

662508
FD 17768



FORMAT B, LEVEL II, PHASE III ENGINEERING LABOR HOURS
(2.0 ENGINE DEVELOPMENT)

662508
FD 17767

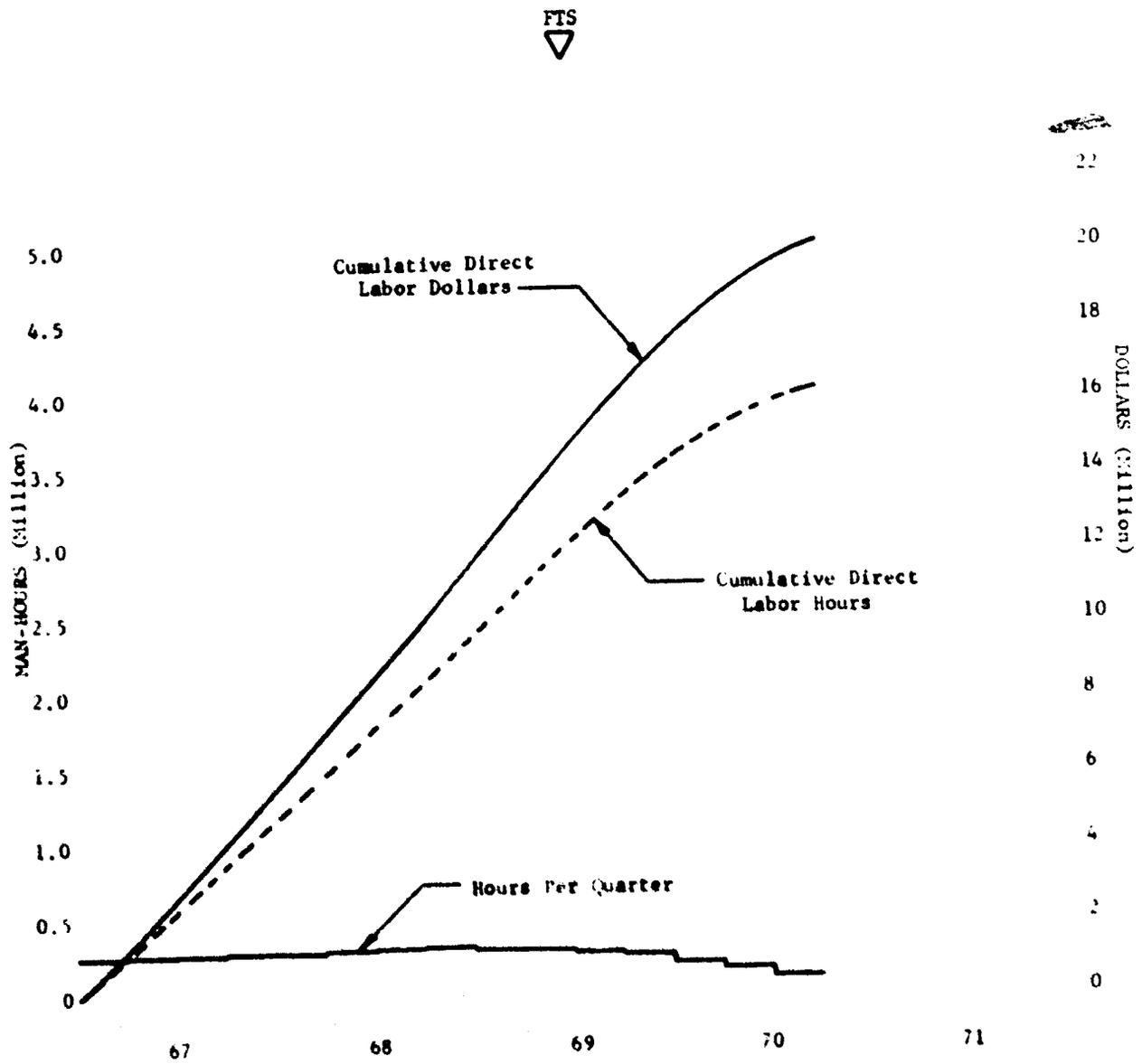


FORMAT B, LEVEL II, PHASE III ENGINEERING LABOR HOURS
(3.0 DESIGN SUPPORT AND INTEGRATION)

662508
FD 17766

TABULATION FOR FORMAT C
LEVEL 1 - JTF17A-21 ENGINE
ENGINEERING LABOR
PHASE III
(DOLLAR AMOUNTS ARE IN THOUSANDS)

Calendar Year	Quarter	Hours	Cumulative Hours	Amount	Cumulative Amount
1967	1	287,040	287,040	$ 1,343	$ 1,343
	2	289,921	576,961	1,358	2,701
	3	292,799	869,760	1,371	4,072
	4	295,680	1,165,440	1,385	5,457
		1,165,440		$ 5,457	
1968	1	299,960	1,465,400	$ 1,467	$ 6,924
	2	304,362	1,769,762	1,489	8,413
	3	311,941	2,081,703	1,528	9,941
	4	316,415	2,398,118	1,551	11,492
		1,232,678		$ 6,035	
1969	1	310,542	2,708,660	$ 1,589	$13,081
	2	305,088	3,013,748	1,563	14,644
	3	295,124	3,308,872	1,515	16,159
	4	270,924	3,579,796	1,394	17,553
		1,181,678		$ 6,061	
1970	1	211,692	3,791,488	$ 1,142	$18,695
	2	167,130	3,958,618	902	19,597
	3	109,152	4,067,770	593	20,190
		487,974		$ 2,637	
Total Phase III		4,067,770		$20,190	

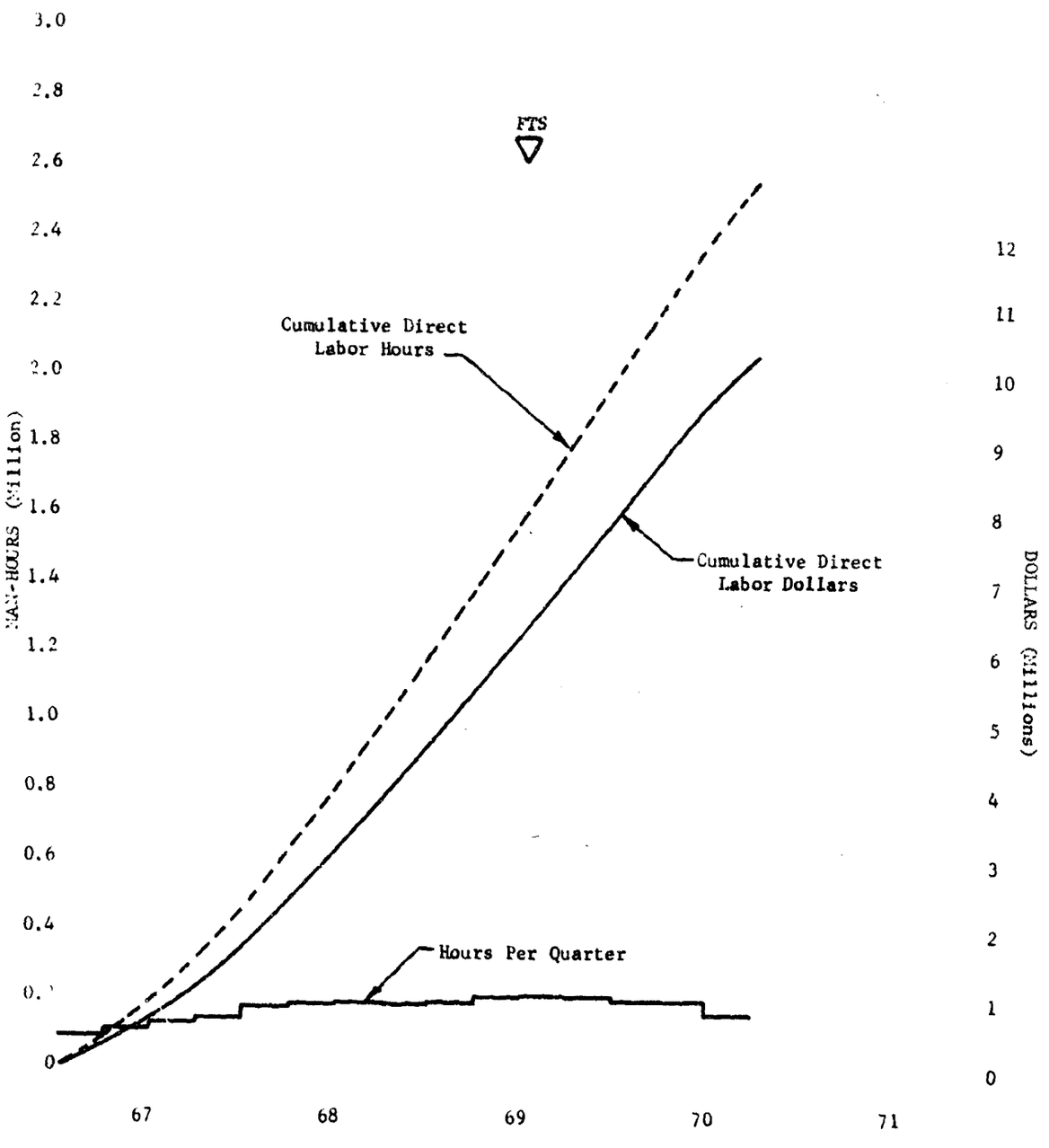


FORMAT C, LEVEL I, PHASE III (ENGINEERING)

662508
FD 17763

TABULATION FOR FORMAT C
LEVEL 1 - JTF17A-21 ENGINE
TEST LABOR
PHASE III
(DOLLAR AMOUNTS ARE IN THOUSANDS)

Calendar Year	Quarter	Hours	Cumulative Hours	Amount	Cumulative Amount
1967	1	87,500	87,500	$ 333	$ 333
	2	104,175	191,675	397	730
	3	120.825	312,500	460	1,190
	4	141,234	452,734	534	1,724
		452,734		$ 1,724	
1968	1	178,000	630,734	$ 701	$ 2,425
	2	182,600	813,334	720	3,145
	3	190,730	1,004,064	751	3,896
	4	189,820	1,193,884	748	4,644
		741,150		$ 2,920	
1969	1	194,536	1,388,420	$ 794	$ 5,438
	2	205,452	1,593,872	838	6,276
	3	209,481	1,803,353	855	7,131
	4	208,811	2,012,164	852	7,983
		818,280		$ 3,339	
1970	1	199,964	2,212,128	$ 844	$ 8,827
	2	200,636	2,412,764	847	9,674
	3	164,900	2,577,664	696	10,370
		565,500		$ 2,387	
Total Phase III		2,577,664		$10,370	

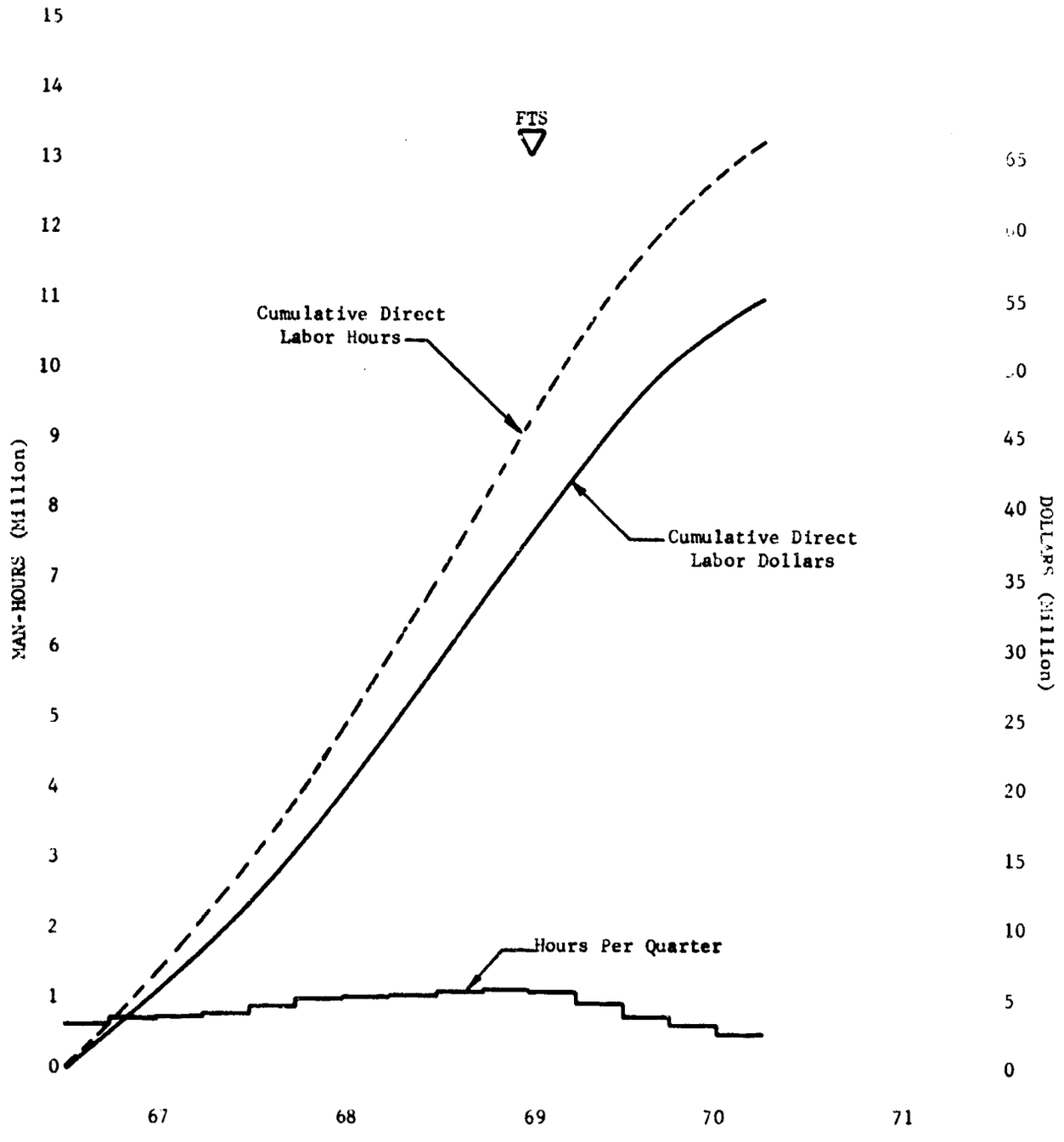


FORMAT C, LEVEL 1, PHASE III (TEST)

662508
FD 17764

TABULATION FOR FORMAT C
LEVEL 1 - JTF17A-21 ENGINE
TOTAL LABOR
PHASE III
(DOLLAR AMOUNTS ARE IN THOUSANDS)

Calendar Year	Quarter	Hours	Cumulative Hours	Amount	Cumulative Amount
1967	1	625,248	625,248	$ 2,575	$ 2,575
	2	742,827	1,368,075	3,003	5,578
	3	771,071	2,139,146	3,111	8,689
	4	804,619	2,943,765	3,239	11,928
		2,943,765		$11,928	
1968	1	914,781	3,858,546	$ 3,778	$15,706
	2	1,024,014	4,882,560	4,185	19,891
	3	1,052,074	5,934,634	4,304	24,195
	4	1,070,104	7,004,738	4,377	28,572
		4,060,973		$16,644	
1969	1	1,121,997	8,126,735	$ 4,731	$33,303
	2	1,167,564	9,294,299	4,903	38,206
	3	1,116,897	10,411,196	4,703	42,909
	4	953,065	11,364,261	4,051	46,960
		4,359,523		$18,388	
1970	1	769,330	12,133,591	$ 3,394	$50,354
	2	666,521	12,800,112	2,929	53,283
	3	504,107	13,304,219	2,196	55,479
		1,939,958		$ 8,519	
Total Phase III		13,304,219		$55,479	



FORMAT C, LEVEL I, PHASE III (TOTAL)

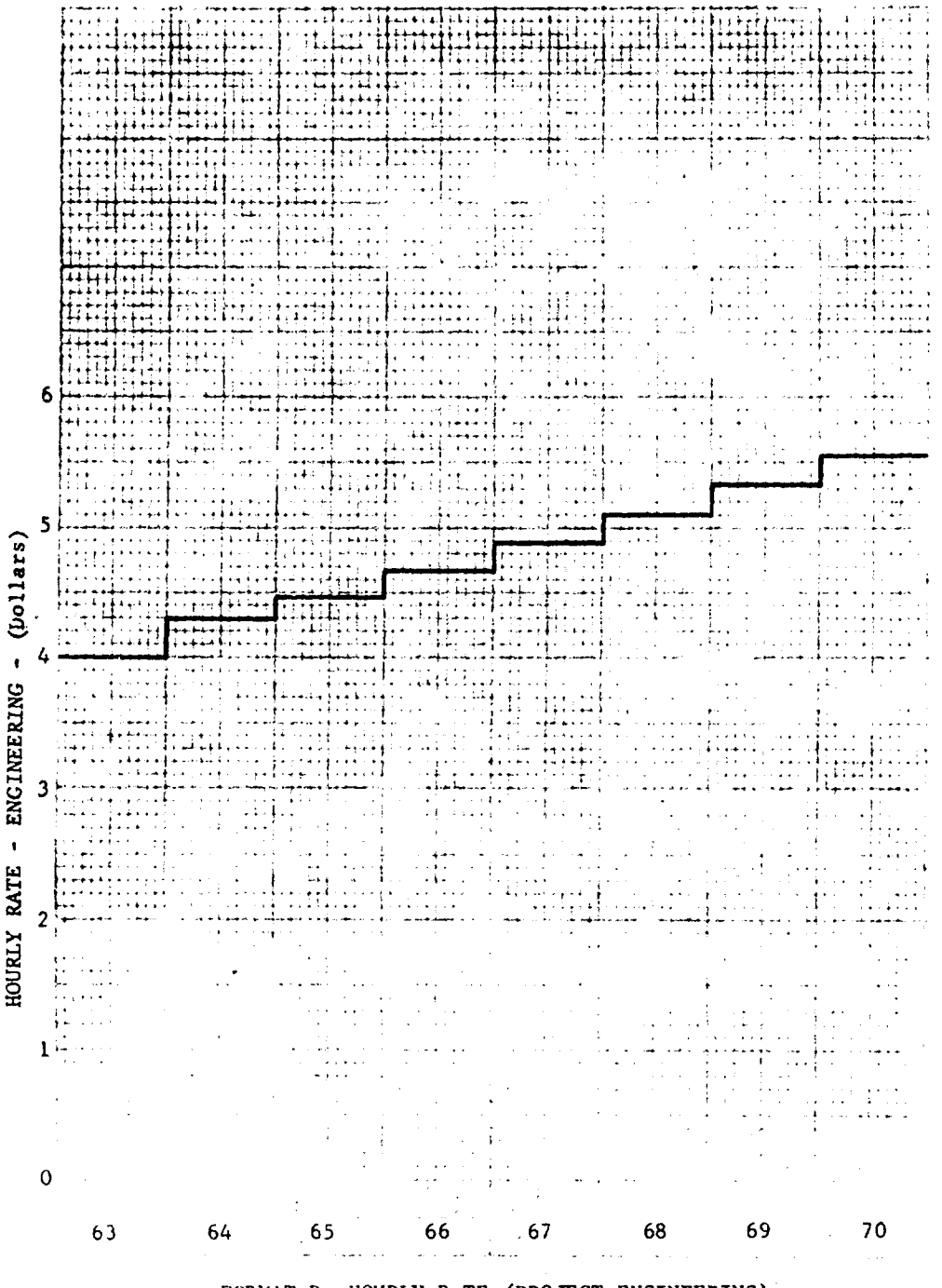
662508
FD 17765

RATE SUPPORT DETAILS FOR FORMAT D
FLORIDA RESEARCH AND DEVELOPMENT CENTER

	Actual Experience		DCAA Approved For Forward Pricing						*% 1964-1965 Escalation
	1963	1964	1965	1966	1967	1968	1969	1970	
Project Engineering	$4.00	$4.29	$4.48	$4.68	$4.89	$5.11	$5.33	$5.56	4.4%
Design Engineering	3.81	4.03	4.20	4.38	4.56	4.75	4.95	5.16	4.2%
Test	3.29	3.44	3.56	3.68	3.81	3.94	4.08	4.22	3.5%
Tooling	3.44	3.55	3.62	3.69	3.76	3.84	3.92	4.00	2.0%
Construction	3.11	3.23	3.34	3.45	3.57	3.69	3.82	3.95	3.4%
Quality	3.19	3.26	3.33	3.40	3.47	3.55	3.63	3.71	2.2%
Assembly	3.08	3.19	3.31	3.44	3.57	3.71	3.85	4.00	3.8%

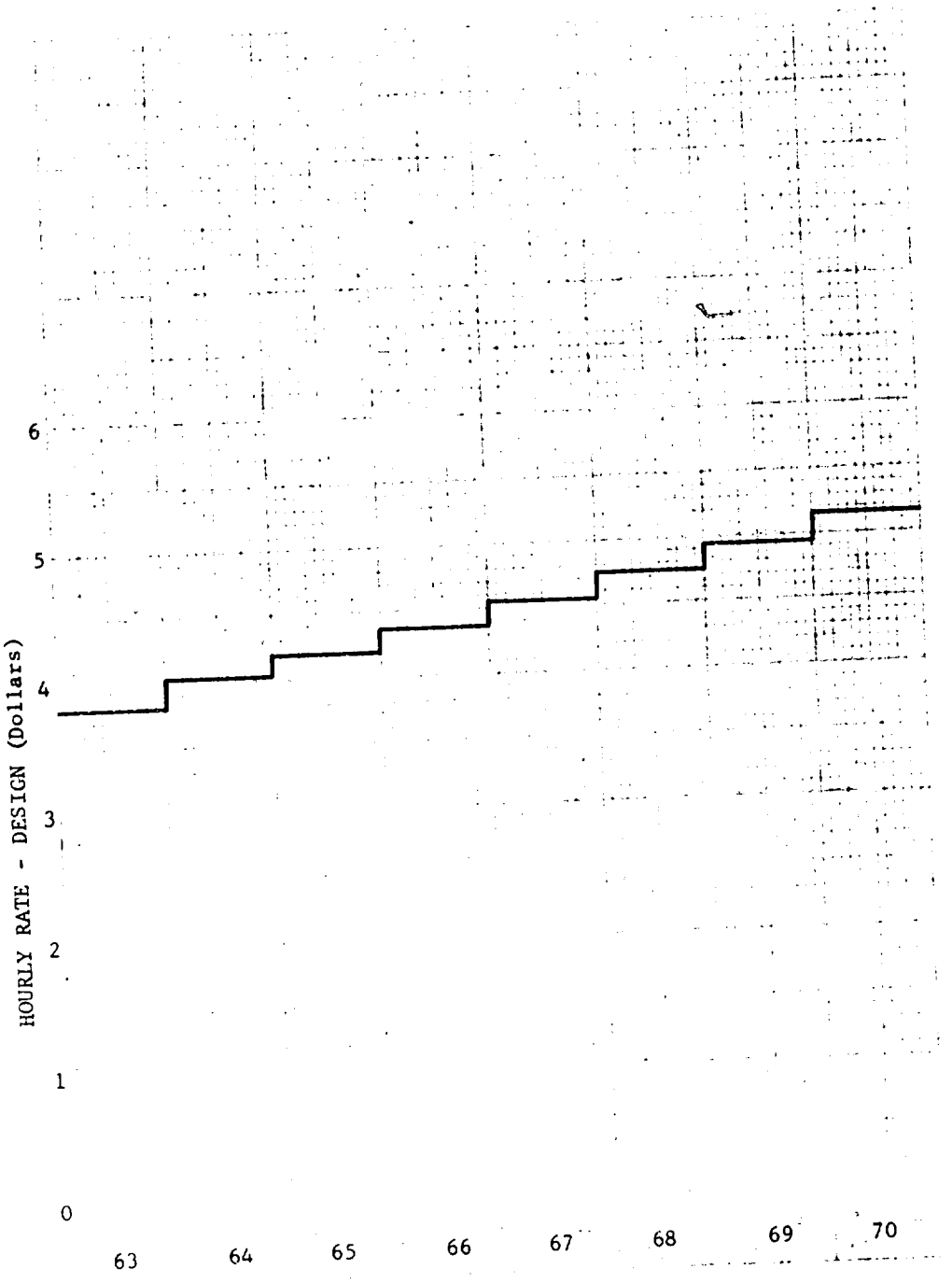
EAST HARTFORD PRODUCTION
BASE STANDARD DIRECT LABOR RATES

January 1963 to November 1963	$2.47
December 1963 to November 1964	2.60
December 1964 to December 1965	2.68
December 1965 to November 1966	2.77
December 1966 to November 1967	2.86



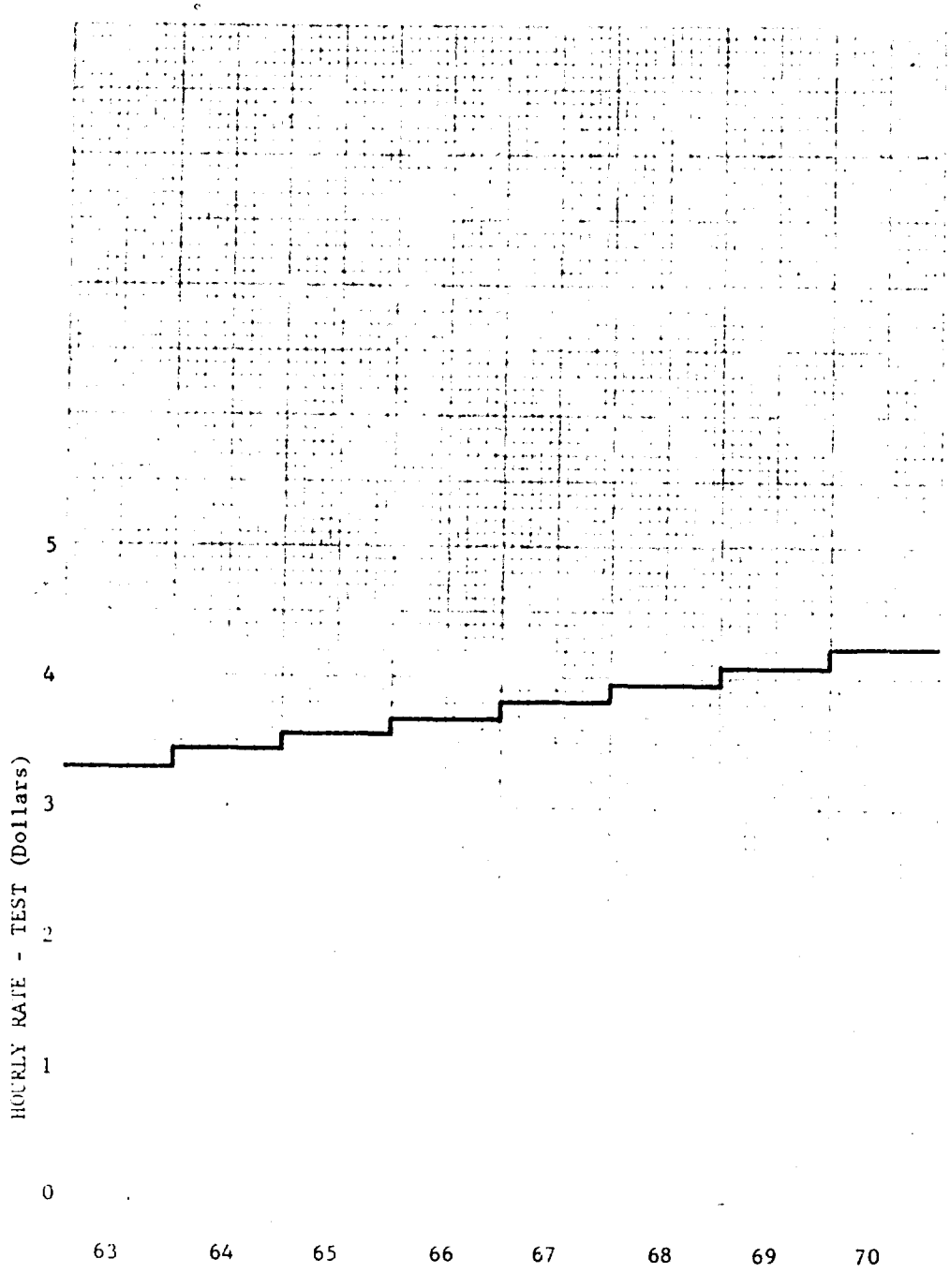
FORMAT D, HOURLY RATE (PROJECT ENGINEERING)

662508
FD 17769

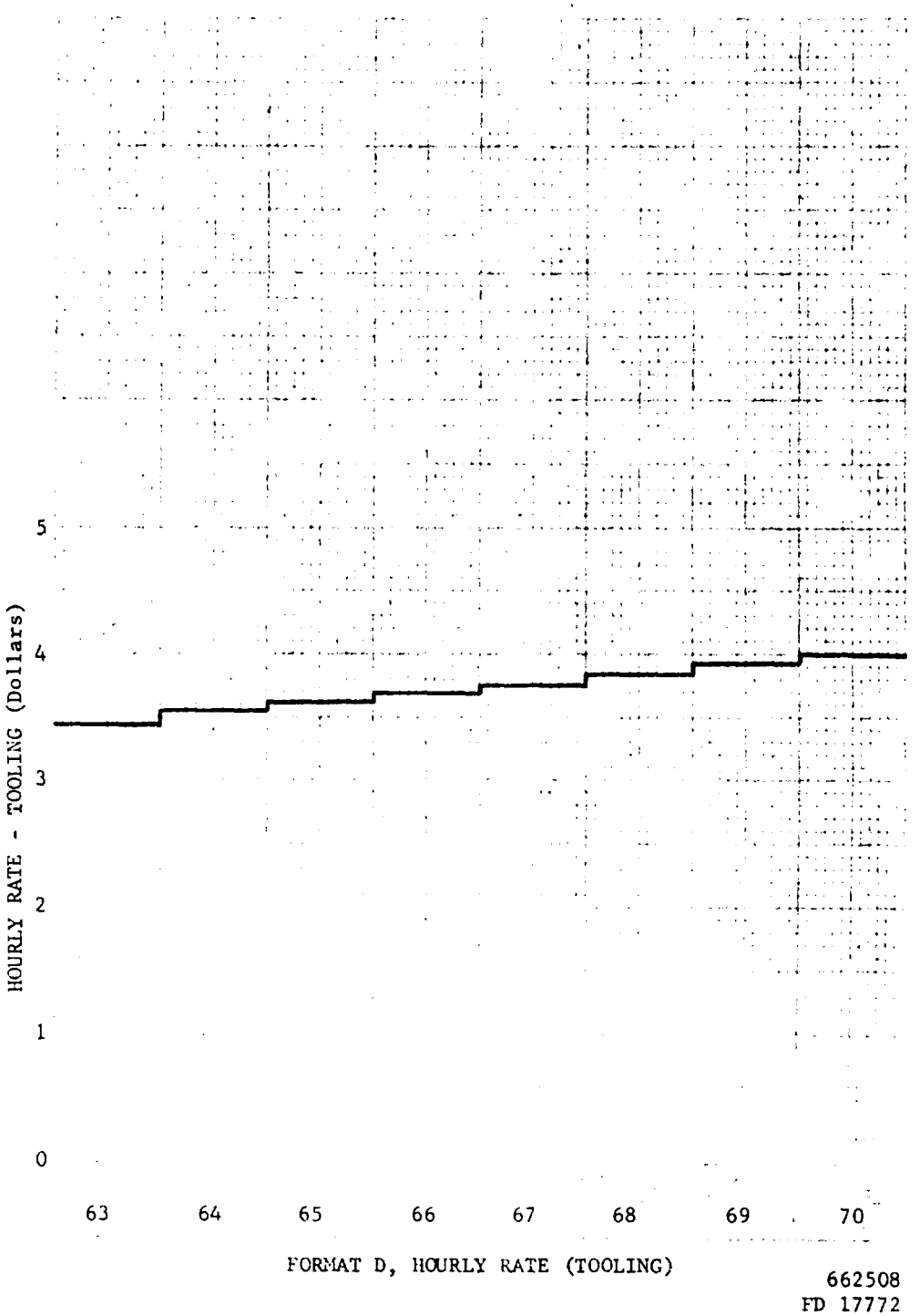


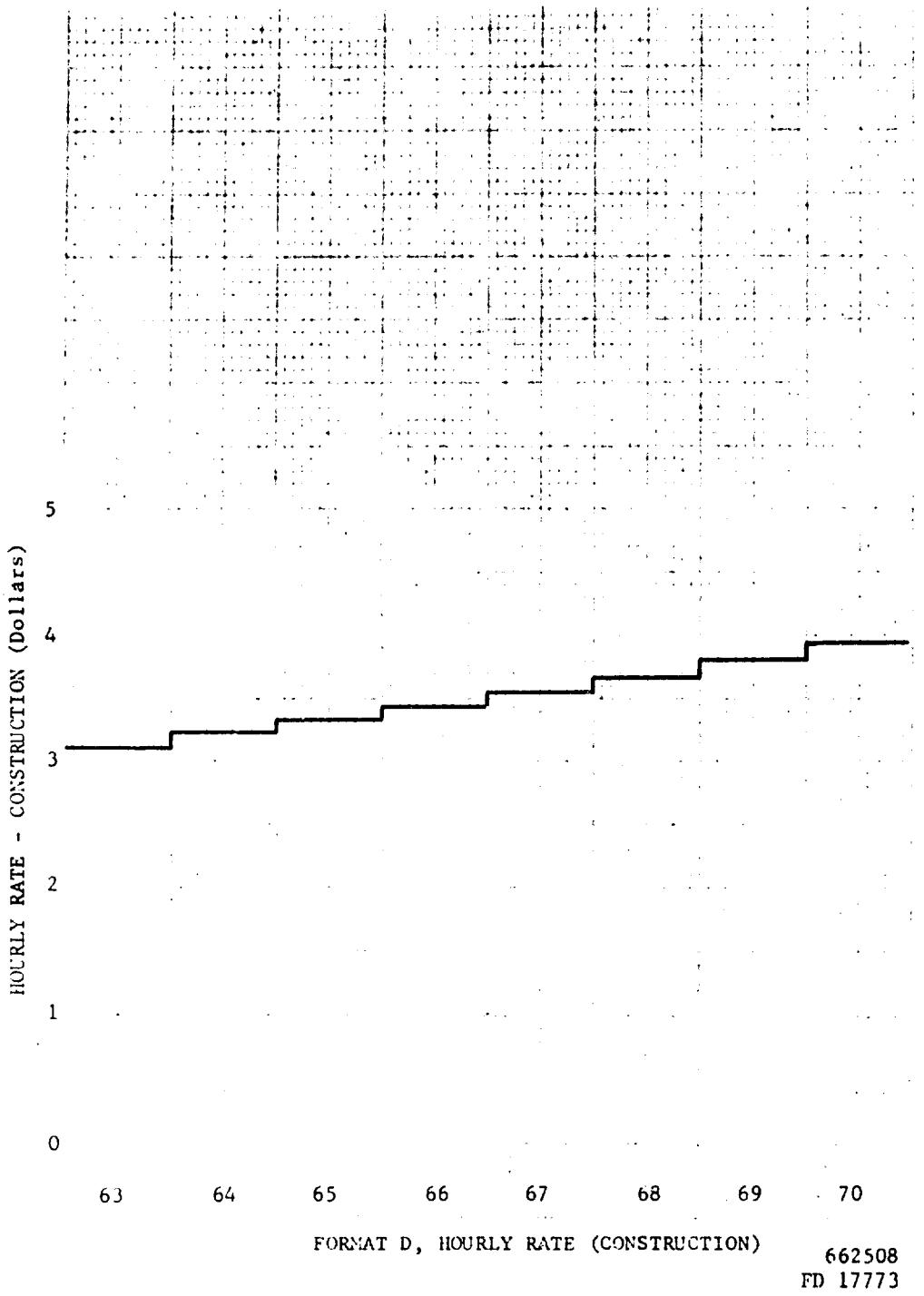
FORMAT D, HOURLY RATE (DESIGN ENGINEERING)

662508
FD 17770



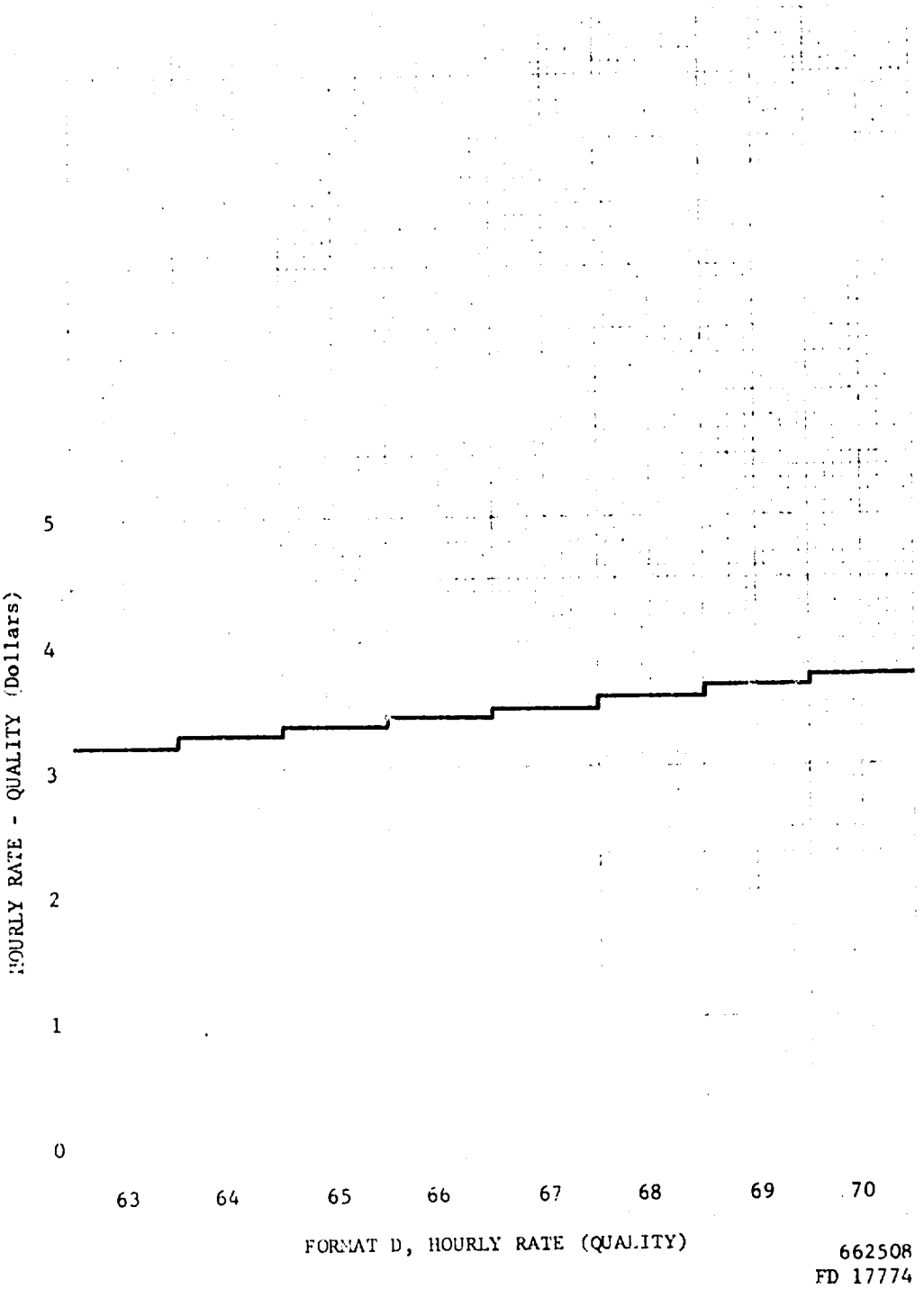
662508
FD 17771

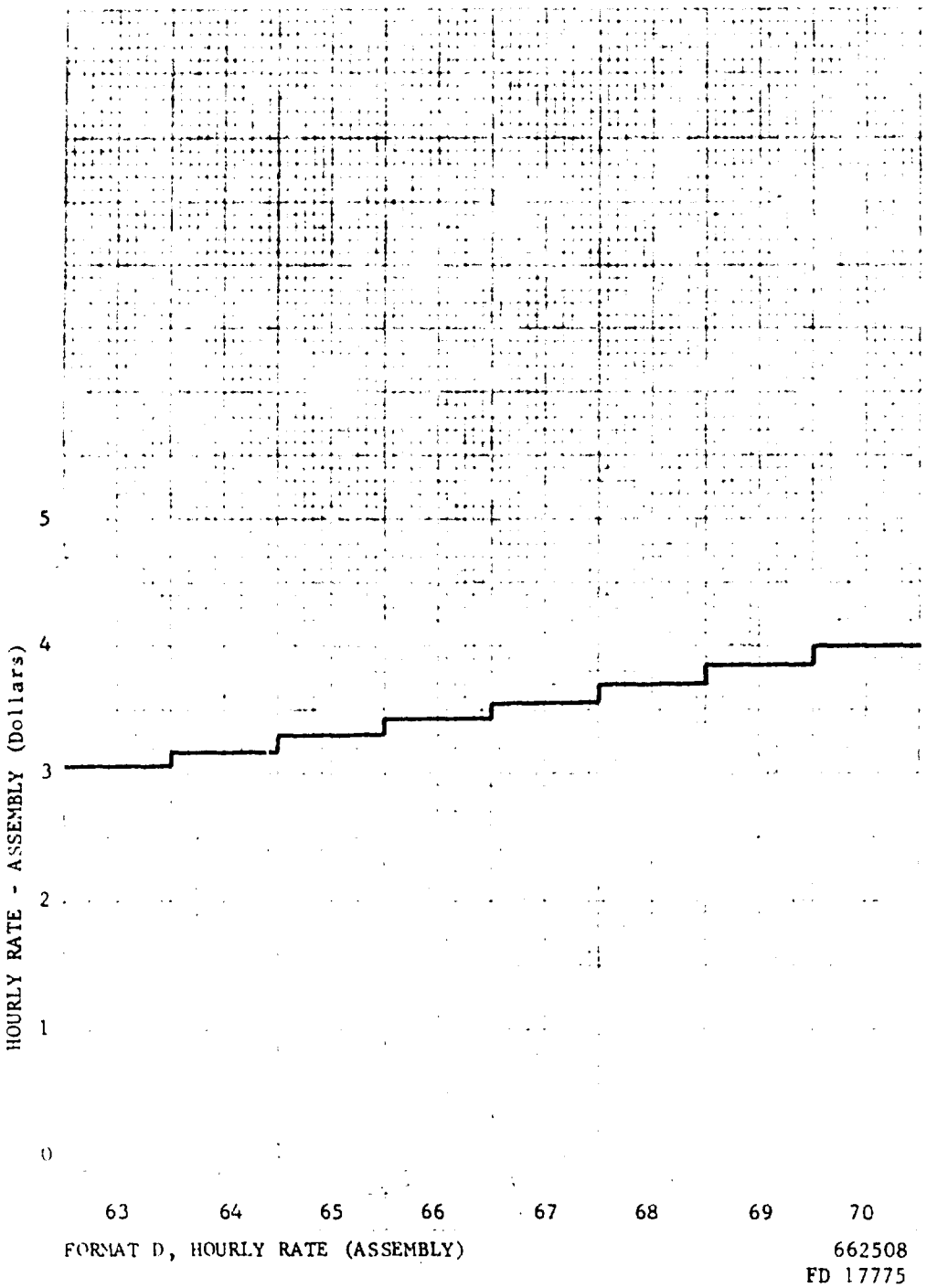

HOURLY RATE - TOOLING (Dollars)
0
1
2
3
4
5
63
64
65
66
67
68
69
70
FORMAT D, HOURLY RATE (TOOLING)
662508
FD 17772

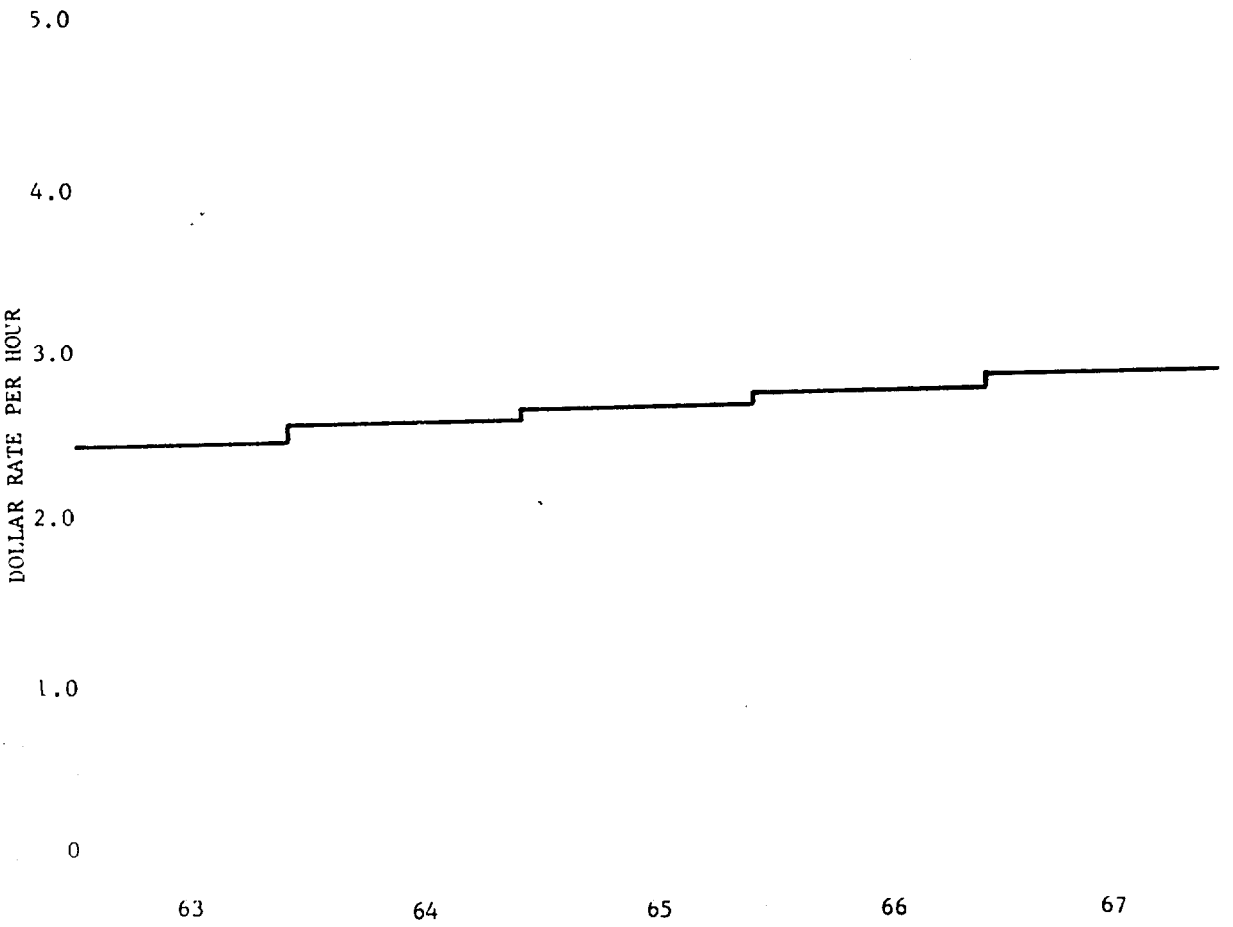


FORMAT D, HOURLY RATE (CONSTRUCTION)

662508
FD 17773


HOURLY RATE - QUALITY (Dollars)
0
1
2
3
4
5
63
64
65
66
67
68
69
70
FORMAT D, HOURLY RATE (QUALITY)
662508
FD 17774


HOURLY RATE - ASSEMBLY (Dollars)
5
4
3
2
1
0
63
64
65
66
67
68
69
70
FORMAT D, HOURLY RATE (ASSEMBLY)
662508
FD 17775



FORMAT D, HOURLY RATE, EAST HARTFORD PRODUCTION

662508
FD 17858

OVERHEAD AND GENERAL AND ADMINISTRATIVE RATES

A detailed history by account and the associated forecasts through the period covering Phase III were submitted on August 1, 1966, to the Defense Contract Audit Agency and the Federal Aviation Agency in accordance with the Request for Proposal (June 30, 1966).

The rates generated on August 1, 1966, have been used throughout our cost estimates for Phases III, IV, and V. As a result, those supporting details are omitted from this submission in the interest of brevity.

In addition, the account descriptions for both Florida and East Hartford overhead pools are unchanged from our December Cost Baseline submission and are, therefore, not duplicated at this time.

It will be noted that although the overhead rates proposed and documented on August 1, 1966, have been rigidly adhered to for pricing purposes, subsequent business forecasts for the Florida Research and Development Center have affected our anticipated level of business and related manpower, and these more recent forecasts have been used in the discussions and related exhibits dealing with Florida "Resources" (Report J).

SUMMARY FORMAT A
PHASE IV
(DOLLAR AMOUNTS ARE IN THOUSANDS)

Level I			Delivery and Product Support	JTF17A-21 Development	Total
I	ENGINEERING				
	Direct Labor	Hrs.	135,200	4,364,506	4,499,706
	Direct Labor	Amt.	$ 661	$ 20,637	$ 21,298
	Overhead	"	741	23,114	23,855
	Subcontracted Effort	"			
	Overtime Premium	"	20	618	638
	Materials	"		1,395	1,395
	Other Direct Charges	"	142	1,248	1,390
	TOTAL ENGINEERING	"	$ 1,564	$ 47,012	$ 48,576
II	TESTING				
	Direct Labor	Hrs.	42,976	2,622,559	2,665,535
	Direct Labor	Amt.	$ 164	$ 9,992	$ 10,156
	Overhead	"	183	11,191	11,374
	Subcontracted Effort	"			
	Overtime Premium	"	5	300	305
	Materials	"	322	19,604	19,926
	Other Direct Charges	"	13	771	784
	TOTAL TESTING	"	$ 687	$ 41,858	$ 42,545
III	TOOLING				
	Direct Labor	Hrs.	11,400	264,184	275,584
	Direct Labor	Amt.	$ 43	$ 993	$ 1,036
	Overhead	"	48	1,113	1,161
	Subcontracted Effort	"			
	Overtime Premium	"	1	30	31
	Materials	"	95	3,973	4,068
	Other Direct Charges	"			
	TOTAL TOOLING	"	$ 187	$ 6,109	$ 6,296
IV	FABRICATION-CONSTRUCTION				
	Direct Labor	Hrs.	446,856	2,808,968	3,255,824
	Direct Labor	Amt.	$ 1,596	$ 10,028	$ 11,624
	Overhead	"	1,787	11,231	13,018
	Subcontracted Effort	"			
	Overtime Premium	"	47	301	348
	Materials	"	14,329	72,750	87,079
	Other Direct Charges	"			
	TOTAL FABRICATION-CONST	"	$17,759	$ 94,310	$ 112,069
V	QUALITY CONTROL				
	Direct Labor	Hrs.	175,990	673,775	849,765
	Direct Labor	Amt.	$ 610	$ 2,338	$ 2,948
	Overhead	"	664	2,619	3,303
	Subcontracted Effort	"			
	Overtime Premium	"	19	70	89
	Materials	"	57	322	379
	Other Direct Charges	"			
	TOTAL QUALITY CONTROL	"	$ 1,370	$ 5,349	$ 6,719
VI	OTHER EFFORT-ASSEMBLY				
	Direct Labor	Hrs.	727,682	1,575,992	2,303,674
	Direct Labor	Amt.	$ 2,598	$ 5,626	$ 8,224
	Overhead	"	1,548	6,301	7,849
	Subcontracted Effort	"			
	Overtime Premium	"	78	169	247
	Materials	"			
	Other Direct Charges	"			
	TOTAL OTHER EFFORT-ASSY	"	$ 4,224	$ 12,096	$ 16,320
	TOTAL DIRECT COST		$25,791	$ 206,734	$ 232,525
VII	GEN'L & ADMIN EXPENSE		2,015	17,676	19,691
	TOTAL COST		$27,806	$ 224,410	$ 252,216

VIII LABOR AND OVERHEAD RATES

Refer to Section VI, Format D (Labor Rates) and Section IX (Overhead Rates).

SUMMARY FORMAT A
PHASE IV
(DOLLAR AMOUNTS ARE IN THOUSANDS)

Level II		1.0 Engine and Component Development	2.0 Management Controls and Product Assurance	3.0 Delivery and Product Support	Total
I ENGINEERING					
Direct Labor	Hrs.	3,802,578	561,928	135,200	4,499,706
Direct Labor	Amt.	$ 17,982	$ 2,655	$ 661	$ 21,298
Overhead	"	20,140	2,974	741	23,855
Subcontracted Effort	"				
Overtime Premium	"	539	79	20	638
Materials	"	1,120	275		1,395
Other Direct Charges	"	1,151	97	142	1,390
TOTAL ENGINEERING	"	$ 40,932	$ 6,080	$ 1,564	$ 48,576
II TESTING					
Direct Labor	Hrs.	2,622,559		42,976	2,665,535
Direct Labor	Amt.	$ 9,992		$ 164	$ 10,156
Overhead	"	11,191		183	11,374
Subcontracted Effort	"				
Overtime Premium	"	300		5	305
Materials	"	19,604		322	19,926
Other Direct Charges	"	771		13	784
TOTAL TESTING	"	$ 41,858		$ 687	$ 42,545
III TOOLING					
Direct Labor	Hrs.	264,184		11,400	275,584
Direct Labor	Amt.	$ 993		$ 43	$ 1,036
Overhead	"	1,113		48	1,161
Subcontracted Effort	"				
Overtime Premium	"	30		1	31
Materials	"	3,973		95	4,068
Other Direct Charges	"				
TOTAL TOOLING	"	$ 6,109		$ 187	$ 6,296
IV FABRICATION-CONSTRUCTION					
Direct Labor	Hrs.	2,808,968		446,856	3,255,824
Direct Labor	Amt.	$ 10,028		$ 1,596	$ 11,624
Overhead	"	11,231		1,787	13,018
Subcontracted Effort	"				
Overtime Premium	"	301		47	348
Materials	"	72,750		14,329	87,079
Other Direct Charges	"				
TOTAL FABRICATION-CONST	"	$ 94,310		$17,759	$ 112,069
V QUALITY CONTROL					
Direct Labor	Hrs.	672,359	1,416	175,990	849,765
Direct Labor	Amt.	$ 2,333	$ 5	$ 610	$ 2,948
Overhead	"	2,613	6	684	3,303
Subcontracted Effort	"				
Overtime Premium	"	70		19	89
Materials	"	322		57	379
Other Direct Charges	"				
TOTAL QUALITY CONTROL	"	$ 5,338	$ 11	$ 1,370	$ 6,719
VI OTHER EFFORT-ASSEMBLY					
Direct Labor	Hrs.	1,575,992		727,682	2,303,674
Direct Labor	Amt.	$ 5,626		$ 2,598	$ 8,224
Overhead	"	6,301		1,548	7,849
Subcontracted Effort	"				
Overtime Premium	"	169		78	247
Materials	"				
Other Direct Charges	"				
TOTAL OTHER EFFORT-ASSY	"	$ 12,096		$ 4,224	$ 16,320
TOTAL DIRECT COST		$ 200,643	$ 6,091	$25,791	$ 232,525
VII GEN'L & ADMIN EXPENSE		17,155	521	2,015	19,691
TOTAL COST		$ 217,798	$ 6,612	$27,806	$ 252,216

SUMMARY FORMAT A
PHASE IV
(DOLLAR AMOUNTS ARE IN THOUSANDS)

Level III Breakdown of Level II Item 1.0 Engine and Component Development		1.01 Engine Design	1.02 Fabrication	1.03 Tooling	1.04 Engine Instrumentation	1.06 Engine Test-Ground	1.07 Engine Performance	1.08 Inlet Sys. Compat-ibility	1.09 Noise	1.10 Growth Potential	1.11 Fan and Compressor
I ENGINEERING											
Direct Labor	Hrs.	1,480,944	206,286		44,273	208,596	151,497	90,540	68,093	39,911	154,228
Direct Labor	Amt.	$ 6,764	$ 1,008		$ 211	$ 1,020	$ 741	$ 434	$ 327	$ 187	$ 736
Overhead	"	7,575	1,130		236	1,142	830	487	367	209	824
Subcontracted Effort	"										
Overtime Premium	"	203	30		6	31	22	13	10	6	22
Materials	"	68	153		7	318		1			24
Other Direct Charges	"	548			15		165	80	61	18	69
TOTAL ENGINEERING	"	$ 15,158	$ 2,321		$ 475	$ 2,511	$ 1,758	$ 1,015	$ 765	$ 420	$ 1,675
II TESTING											
Direct Labor	Hrs.				194,264	1,450,521			13,374		232,688
Direct Labor	Amt.				$ 740	$ 5,526			$ 51		$ 887
Overhead	"				829	6,190			57		993
Subcontracted Effort	"										
Overtime Premium	"				22	166			2		27
Materials	"				437	16,554			30		523
Other Direct Charges	"					673					98
TOTAL TESTING	"				$ 2,028	$ 29,109			$ 140		$ 2,528
III TOOLING											
Direct Labor	Hrs.			264,184							
Direct Labor	Amt.			$ 993							
Overhead	"			1,113							
Subcontracted Effort	"										
Overtime Premium	"			30							
Materials	"			3,973							
Other Direct Charges	"										
TOTAL TOOLING	"			$ 6,109							
IV FABRICATION-CONSTRUCTION											
Direct Labor	Hrs.		2,435,679								92,426
Direct Labor	Amt.		$ 8,695								$ 330
Overhead	"		9,739								369
Subcontracted Effort	"										
Overtime Premium	"		261								10
Materials	"		63,082								3,932
Other Direct Charges	"										
TOTAL FABRICATION-CONST	"		$ 81,777								$ 4,641
V QUALITY CONTROL											
Direct Labor	Hrs.		569,059		11,513	3,857					20,629
Direct Labor	Amt.		$ 1,975		$ 40	$ 13					$ 72
Overhead	"		2,211		45	15					80
Subcontracted Effort	"										
Overtime Premium	"		60		1						2
Materials	"		272		6	2					10
Other Direct Charges	"										
TOTAL QUALITY CONTROL	"		$ 4,5[illegible]		$ 92	$ 30					$ 164
VI OTHER EFFORT-ASSEMBLY											
Direct Labor	Hrs.		1,358,183								76,235
Direct Labor	Amt.		$ 4,849								$ 272
Overhead	"		5,431								305
Subcontracted Effort	"										
Overtime Premium	"		145								8
Materials	"										
Other Direct Charges	"										
TOTAL OTHER EFFORT-ASSY	"		$ 10,425								$ 585
TOTAL DIRECT COST		$ 15,158	$ 99,041	$ 6,109	$ 2,595	$ 31,650	$ 1,758	$ 1,015	$ 905	$ 420	$ 9,593
VII GEN'L & ADMIN EXPENSE		1,296	8,468	522	222	2,706	150	87	77	36	820
TOTAL COST		$ 16,454	$ 107,509	$ 6,631	$ 2,817	$ 34,356	$ 1,908	$ 1,102	$ 982	$ 456	$ 10,413

A

SUMMARY FORMAT A
PHASE IV
(DOLLAR AMOUNTS ARE IN THOUSANDS)

Inlet Sys. Compat.-ibility	1.09 Noise	1.10 Growth Potential	1.11 Fan and Compressor	1.12 Primary Combustor	1.13 Turbine	1.14 Augmentor	1.15 Exhaust System	1.16 Controls and Accessories	1.17 Lubricants, Lubrication Sys., Bearings, Seals, And Gears	1.18 Fuels	1.19 Manufacturing Techniques and Materials	1.20 Weight Control and Status
,540	68,093	39,911	154,228	85,001	151,721	130,448	50,828	601,351	229,674	39,940	29,389	39,858
434	$ 327	$ 187	$ 736	$ 408	$ 731	$ 627	$ 244	$ 2,922	$ 1,104	$ 193	$ 141	$ 184
487	367	209	824	457	819	702	273	3,273	1,236	216	158	206
13	10	6	22	12	22	19	7	88	33	6	4	5
1			24	21	131	33	1	192	83	50	38	
80	61	18	69	17	20	20	45	52	22	3	4	12
,015	$ 765	$ 420	$ 1,675	$ 915	$ 1,723	$ 1,401	$ 570	$ 6,527	$ 2,478	$ 468	$ 345	$ 407
	13,374		232,688	135,199	56,056	54,662		387,229	98,566			
	$ 51		$ 887	$ 515	$ 214	$ 208	$	$ 1,476	$ 375			
	57		993	577	239	233		1,652	421			
	2		27	16	6	6		44	11			
	30		523	304	126	124	413	871	222			
			98									
	$ 140		$ 2,528	$ 1,412	$ 585	$ 571	$ 413	$ 4,043	$ 1,029			
			92,426	83,692	126,173	35,052		28,481	7,465			
			$ 330	$ 299	$ 450	$ 125		$ 102	$ 27			
			369	335	504	140		114	30			
			10	9	14	4		3				
			3,932	659	2,953	1,016		587	521			
			$ 4,641	$ 1,302	$ 3,921	$ 1,285		$ 806	$ 578			
			20,629	10,490	29,386	17,129		7,148	3,148			
			$ 72	$ 36	$ 102	$ 59		$ 25	$ 11			
			80	41	114	67		28	12			
			2	1	3	2		1				
			10	5	14	8		3	2			
			$ 164	$ 83	$ 233	$ 136		$ 57	$ 25			
			76,235	19,602	28,315	19,602		23,958	50,097			
			$ 272	$ 70	$ 101	$ 70		$ 85	$ 179			
			305	78	113	78		96	200			
			8	2	3	2		3	6			
			$ 585	$ 150	$ 217	$ 150		$ 184	$ 385			
,015	$ 905	$ 420	$ 9,593	$ 3,862	$ 6,679	$ 3,543	$ 983	$11,617	$ 4,495	$ 468	$ 345	$ 407
87	77	16	820	331	571	303	84	993	384	40	30	35
,102	$ 982	$ 436	$10,413	$ 4,193	$ 7,250	$ 3,846	$ 1,067	$12,610	$ 4,879	$ 508	$ 375	$ 442

SUMMARY FORMAT A
PHASE IV
(DOLLAR AMOUNTS ARE IN THOUSANDS)

Level III Breakdown of Level II, Item 2.0 Management Controls and Product Assurance		2.01 Coordination	2.02 Maintainability and Human Engineering	2.03 Reliability	2.04 Quality Assurance	2.05 Value Engineering	2.06 Configuration Management	2.07 Safety	2.08 Test Planning and Integration	2.09 Data Management	2.10 Program Management and Controls	2.11 Facilities Plan	2.12 Cost Analysis
I ENGINEERING													
Direct Labor	Hrs.	86,126	44,253	125,696	No Direct	53,178	35,421	37,414	5,888	99,200	51,200	No Direct	23,552
Direct Labor	Amt.	$ 409	$ 209	$ 605	Cost	$ 244	$ 166	$ 173	$ 29	$ 457	$ 248	Cost	$ 115
Overhead	"	459	234	678		274	185	193	32	512	278		129
Subcontracted Effort	"				Included							Included	
Overtime Premium	"	12	6	18		7	5	5	1	14	7		4
Materials	"				In					275		In	
Other Direct Charges	"	49		48									
TOTAL ENGINEERING	"	$ 929	$ 449	$ 1,349	Overhead	$ 525	$ 356	$ 371	$ 62	$1,258	$ 533	Overhead	$ 248
					Or							Or	
					In							In	
V QUALITY CONTROL													
Direct Labor	Hrs.			283	Other	1,133						Other	
Direct Labor	Amt.			$ 1	Items	$ 4						Items	
Overhead	"			1		5							
Subcontracted Effort	"												
Overtime Premium	"												
Materials	"												
Other Direct Charges	"												
TOTAL QUALITY CONTROL	"			$ 2		$ 9							
TOTAL DIRECT COST		$ 929	$ 449	$ 1,351		$ 534	$ 356	$ 371	$ 62	$1,258	$ 533		$ 248
VII GEN'L & ADMIN EXPENSE		79	38	116		46	30	32	5	108	46		21
TOTAL COST		$1,008	$ 487	$ 1,467		$ 580	$ 386	$ 403	$ 67	$1,366	$ 579		$ 269

SUMMARY FORMAT A
PHASE IV
(DOLLAR AMOUNTS ARE IN THOUSANDS)

Level III Breakdown of Level II Item 3.0 Delivery and Product Support		3.05 Spares	3.06 Overhaul	3.07 Engine Test and Evaluation Flight	3.08 Data and Handbooks	3.09 Training and Training Equipment
I ENGINEERING						
Direct Labor	Hrs.			135,200	No Direct	No Direct
Direct Labor	Amt.			$ 661	Cost -	Cost -
Overhead	"			741		
Subcontracted Effort	"				Included	Included
Overtime Premium	"			20		
Materials	"				In	In
Other Direct Charges	"			142		
TOTAL ENGINEERING	"			$ 1,564	Overhead	Overhead
II TESTING						
Direct Labor	Hrs.		42,976			
Direct Labor	Amt.		$ 164			
Overhead	"		183			
Subcontracted Effort	"					
Overtime Premium	"		5			
Materials	"		322			
Other Direct Charges	"		13			
TOTAL TESTING	"		$ 687			
III TOOLING						
Direct Labor	Hrs.		11,400			
Direct Labor	Amt.		$ 43			
Overhead	"		48			
Subcontracted Effort	"					
Overtime Premium	"		1			
Materials	"		95			
Other Direct Charges	"					
TOTAL TOOLING	"		$ 187			
IV FABRICATION-CONSTRUCTION						
Direct Labor	Hrs.	331,016	115,840			
Direct Labor	Amt.	$ 1,182	$ 414			
Overhead	"	1,324	463			
Subcontracted Effort	"					
Overtime Premium	"	35	12			
Materials	"	14,329				
Other Direct Charges	"					
TOTAL FABRICATION-CONST	"	$16,870	$ 889			
V QUALITY CONTROL						
Direct Labor	Hrs.	111,990	64,000			
Direct Labor	Amt.	$ 388	$ 222			
Overhead	"	435	249			
Subcontracted Effort	"					
Overtime Premium	"	12	7			
Materials	"	57				
Other Direct Charges	"					
TOTAL QUALITY CONTROL	"	$ 892	$ 478			

SUMMARY FORMAT A (CONTINUED)
PHASE IV
(DOLLAR AMOUNTS ARE IN THOUSANDS)

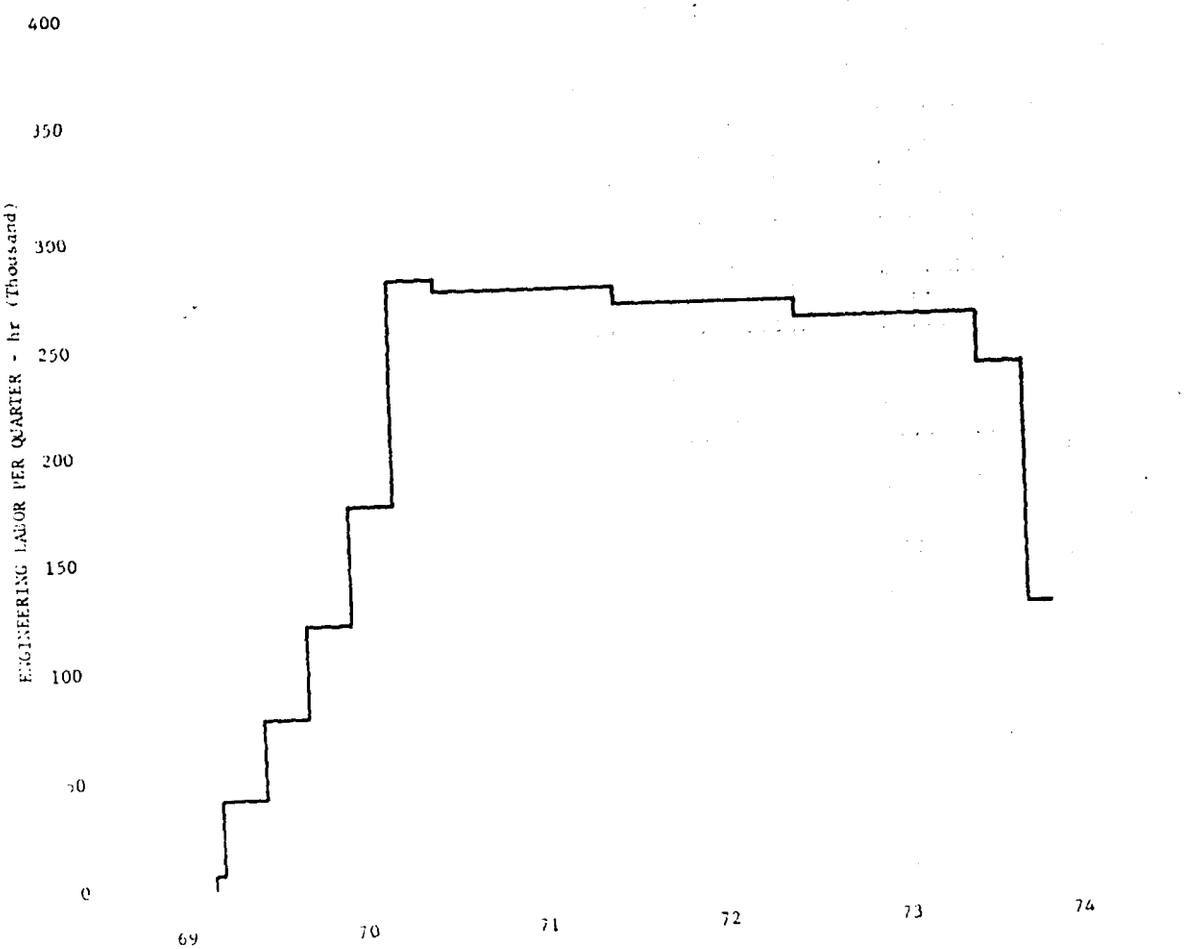
Level III Breakdown of Level II Item 3.0 Delivery and Product Support		3.05 Spares	3.06 Overhaul	3.07 Engine Test and Evaluation Flight	3.08 Data and Handbooks	3.09 Training and Training Equipment
VI OTHER EFFORT-ASSEMBLY						
Direct Labor	Hrs.	66,198	195,200	466,284		
Direct Labor	Amt.	$ 236	$ 697	$ 1,665		
Overhead	"	265	780	503 *		
Subcontracted Effort	"					
Overtime Premium	"	7	21	50		
Materials	"					
Other Direct Charges	"					
TOTAL OTHER EFFORT-ASSY	"	$ 508	$ 1,498	$ 2,218		
TOTAL DIRECT COST		$18,270	$ 3,739	$ 3,782		
VII GEN'L & ADMIN EXPENSE		1,562	319	134 **		
TOTAL COST		$19,832	$ 4,058	$ 3,916		

* The labor shown under Item 3.07, Engine Test and Evaluation-Flight, for the category Other Effort is for assembly personnel in the field to support the aircraft certification flight test program. This effort will be expended at the airframe contractor's plant, flight test site, or other required supporting facilities. These field personnel will bear an estimated 18.4% fringe benefit charge applicable to the direct labor cost and a 10% handling charge on the total of their direct labor and fringe benefits in lieu of the Engineering Overhead.

** The total direct cost shown for Item 3.07, Engine Test and Evaluation-Flight, for the category Other Effort is considered Field Personnel Expense and excluded in the application of the General and Administrative Expense Rate.

TABULATION FOR FORMAT B
LEVEL I - JTF17A-21 ENGINE
PHASE IV
(STRAIGHT TIME HOURS)

Calendar Year	Quarter	Engineering	Test	Tooling	Construction	Quality	Assembly	Total
1969	3	5,640		609	6,474	1,056		13,779
	4	40,608		3,651	38,826	6,337	6,401	95,823
		46,248		4,260	45,300	7,393	6,401	109,602
1970	1	76,813		6,088	64,735	9,520	9,400	166,556
	2	119,152		7,914	103,665	22,135	13,304	266,170
	3	174,554	34,066	9,976	133,661	33,352	54,223	439,832
	4	277,760	187,979	19,103	242,954	62,168	147,417	937,381
		648,279	222,045	43,081	545,015	127,175	224,344	1,809,939
1971	1	273,653	183,765	20,932	260,696	64,459	135,456	938,961
	2	273,653	183,135	20,323	240,614	57,311	134,733	909,769
	3	273,653	181,870	19,106	226,478	56,576	138,794	896,477
	4	273,652	183,129	19,106	208,151	50,581	140,680	875,299
		1,094,611	731,899	79,467	935,939	228,927	549,663	3,620,506
1972	1	265,035	172,020	18,259	194,139	44,072	133,217	826,742
	2	265,035	168,260	17,045	181,228	42,867	136,977	811,412
	3	265,035	167,857	15,781	185,945	51,479	149,225	835,322
	4	265,035	167,329	14,235	173,211	53,372	153,306	826,488
		1,060,140	675,466	65,320	734,523	191,790	572,725	3,299,964
1973	1	256,417	166,642	12,409	153,796	47,255	152,385	788,904
	2	256,417	162,882	12,409	153,796	47,255	152,385	785,144
	3	256,417	161,618	12,107	150,594	47,255	152,385	780,376
	4	256,417	161,002	12,108	147,014	46,041	151,668	774,250
		1,025,668	652,144	49,033	605,200	187,806	608,823	3,128,674
1974	1	233,417	150,427	12,106	133,014	38,576	138,052	705,592
	2	121,362	73,623	5,782	61,484	17,111	65,442	344,804
		354,779	224,050	17,888	194,498	55,687	203,494	1,050,396
Total Phase IV		4,229,725	2,505,604	259,049	3,060,475	798,778	2,165,450	13,019,081



FORMAT B, LEVEL 1, PHASE IV (ENGINEERING LABOR HOURS)

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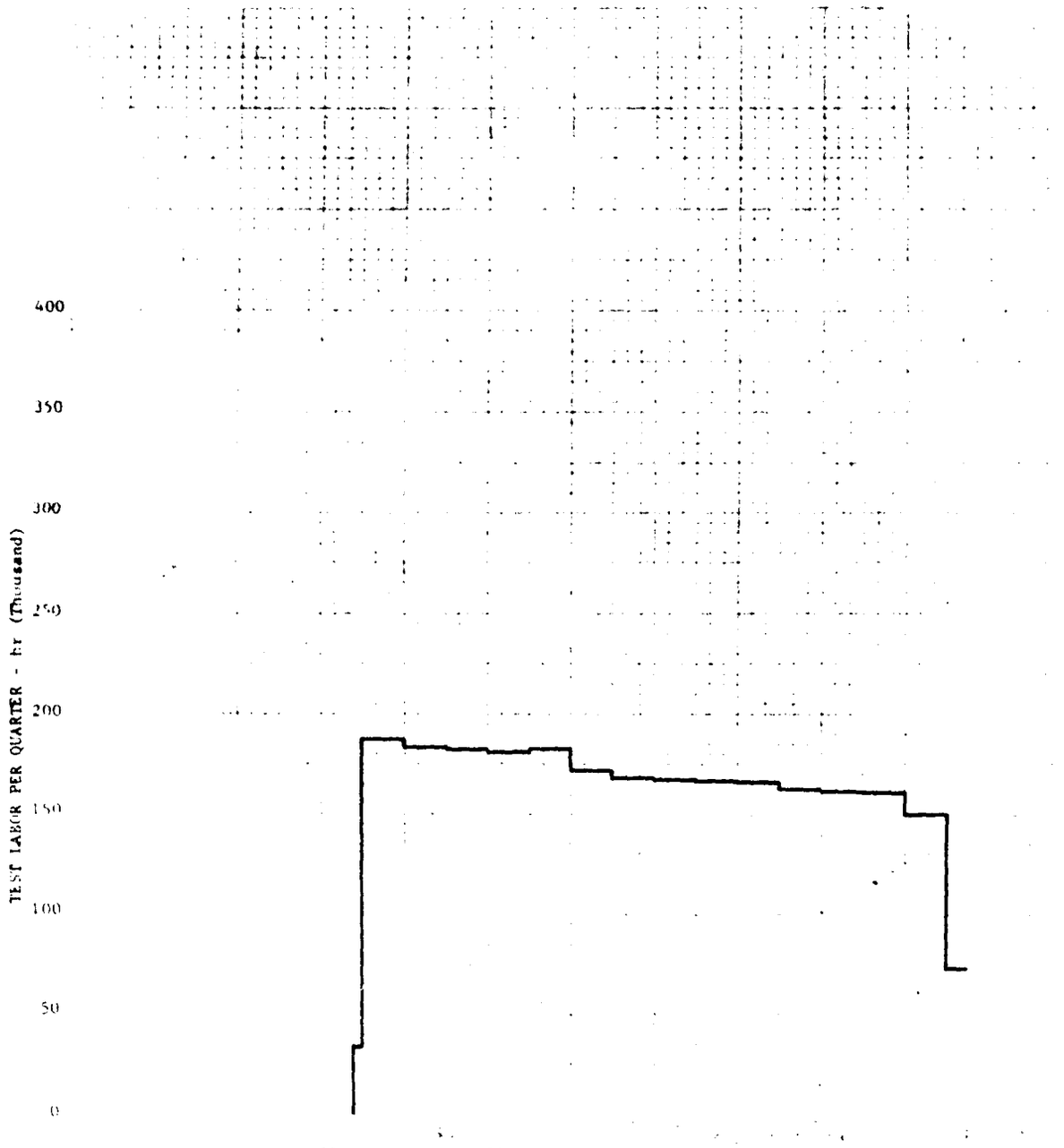
FD 17779



FORMAT B, LEVEL I, PHASE IV (TEST LABOR HOURS)

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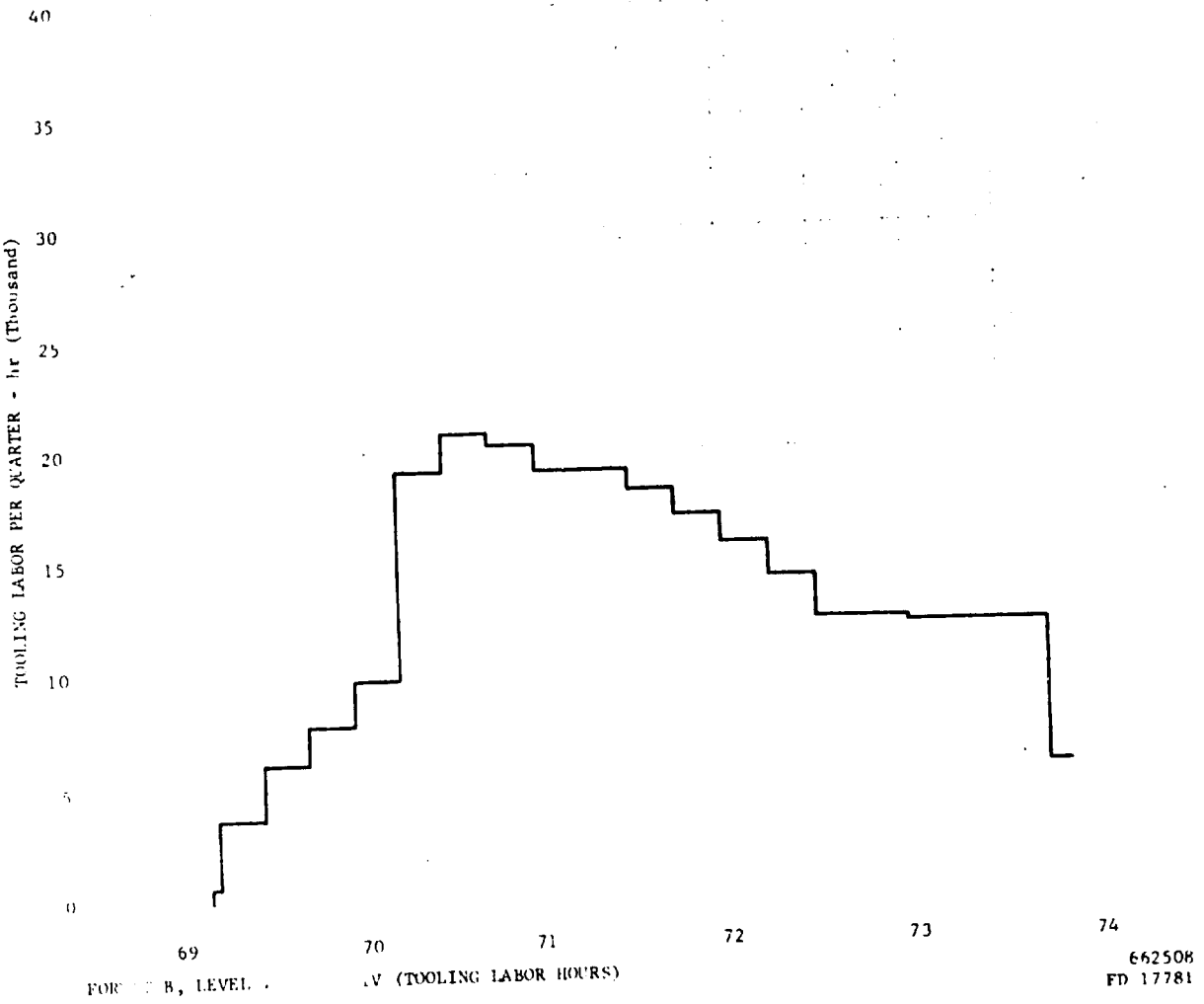

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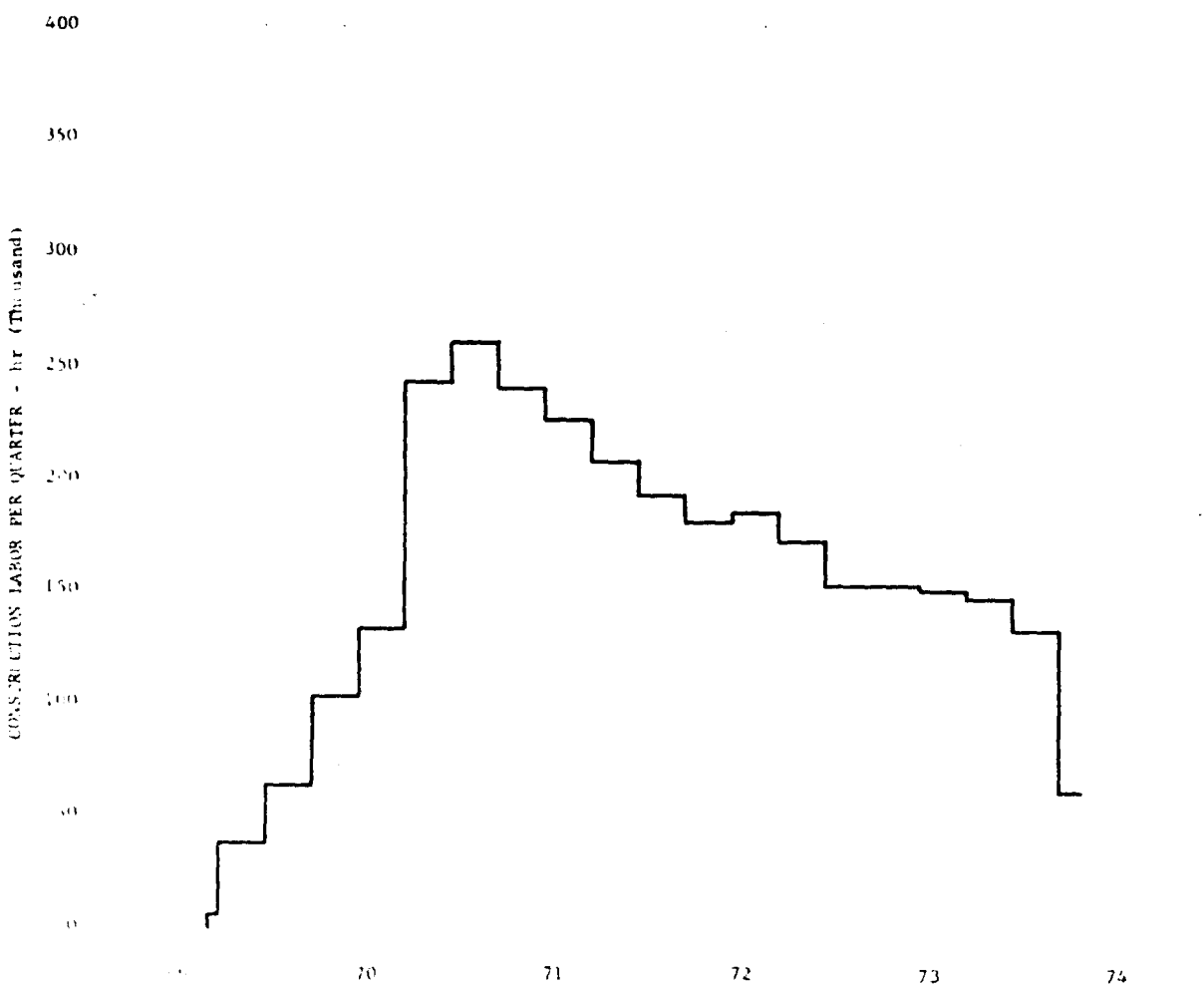
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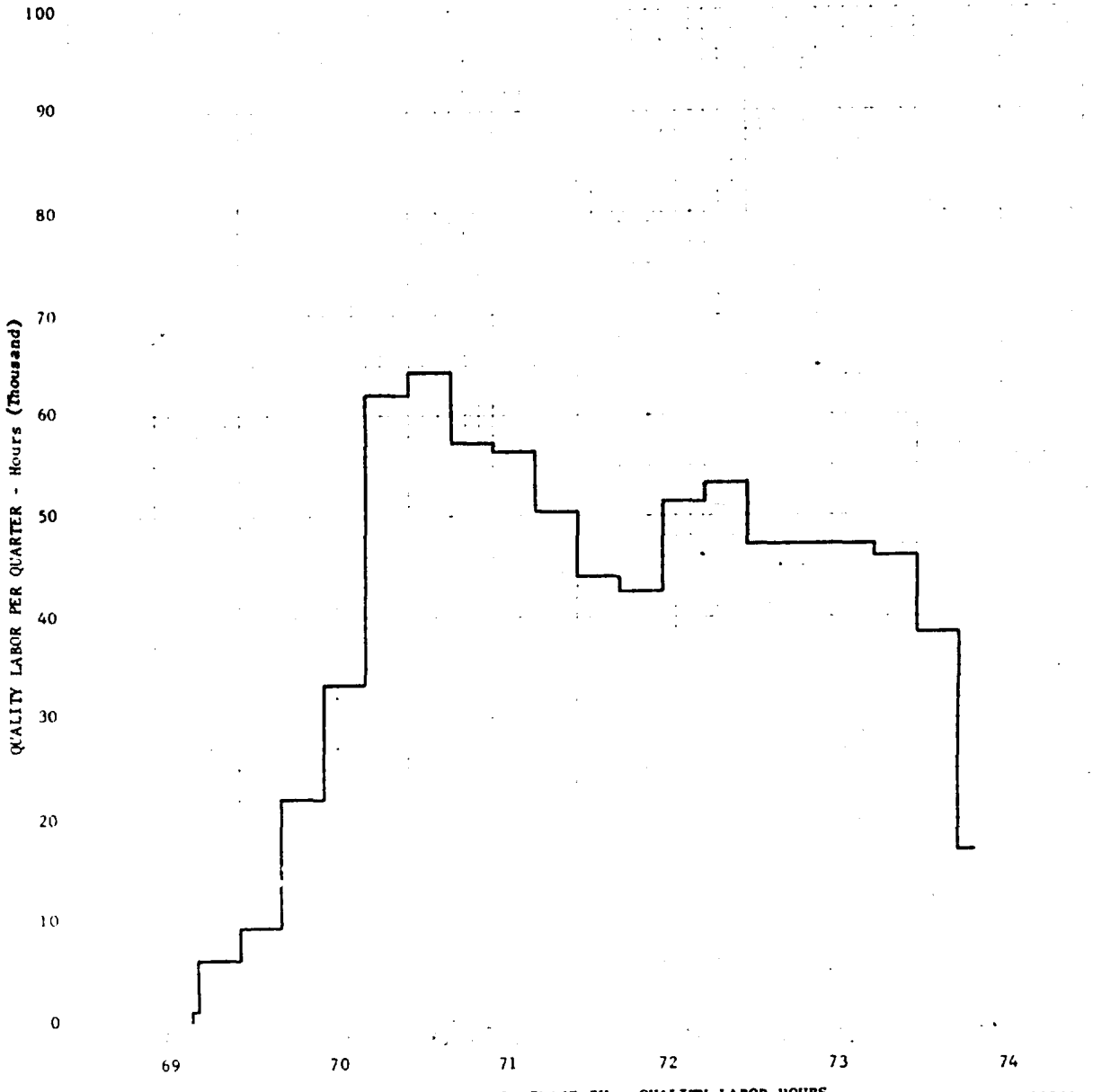
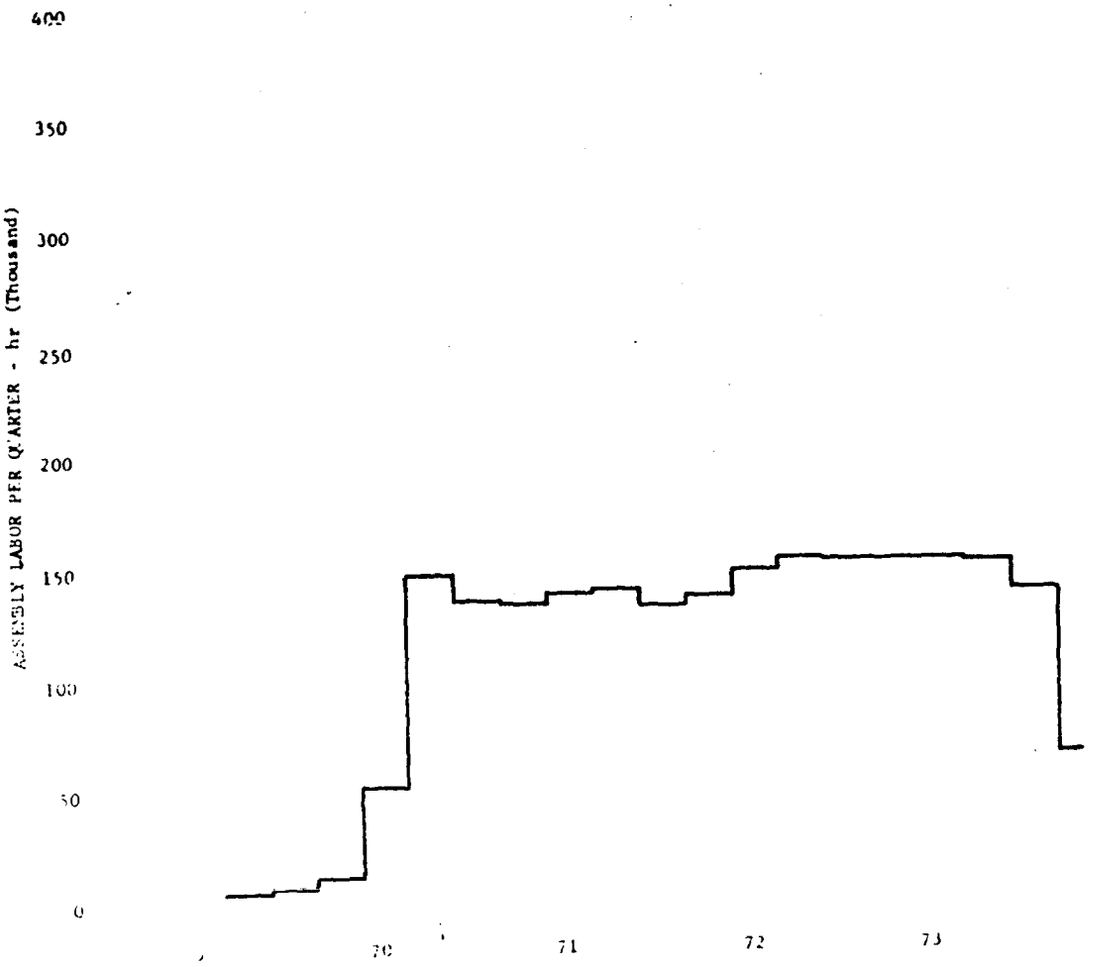


FORMAT B, LEVEL I, PHASE IV - QUALITY LABOR HOURS

662608
FD 17783



FORMAT E, LEVEL 1, PHASE IV (ASSEMBLY LABOR HOURS)

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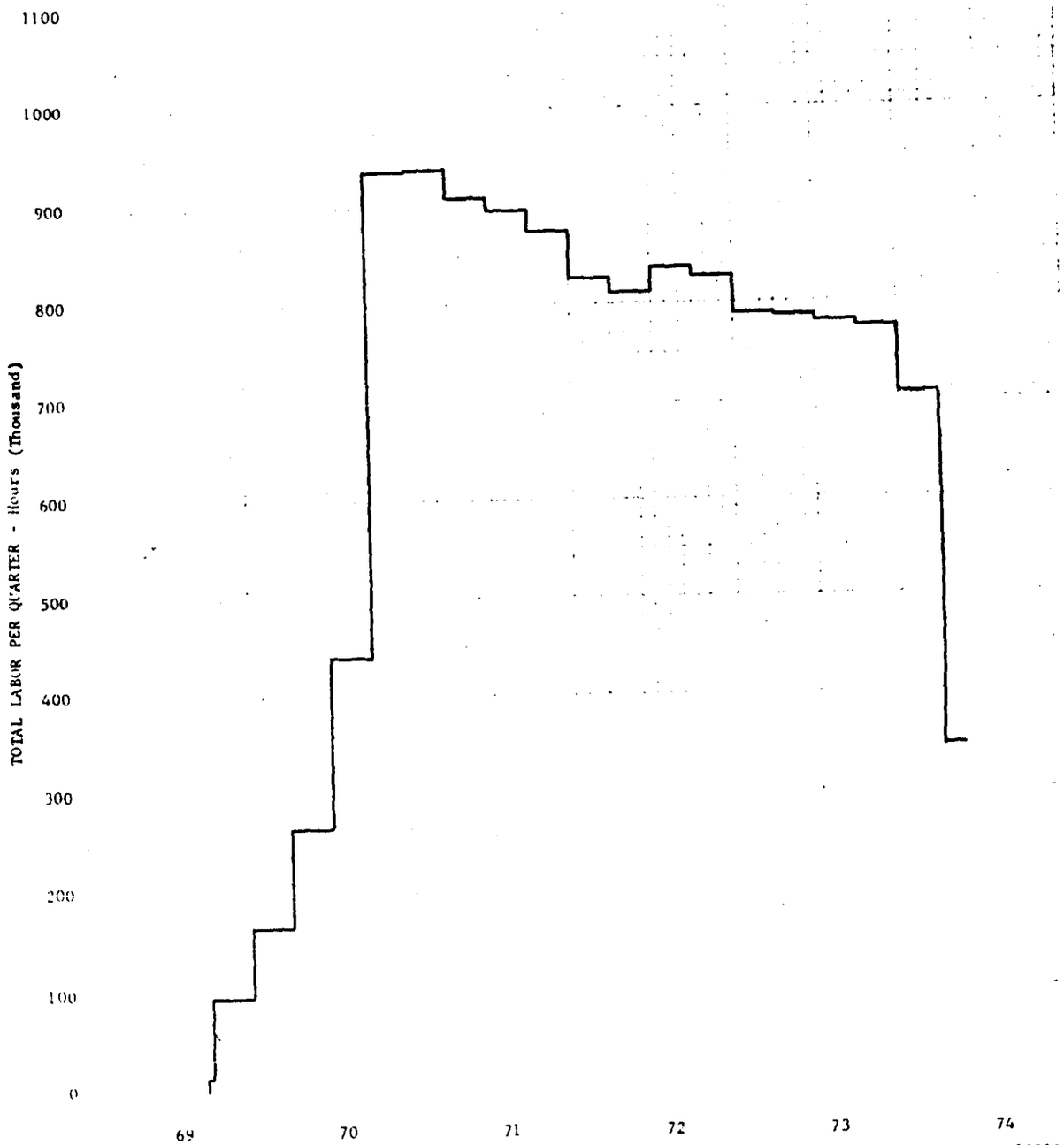
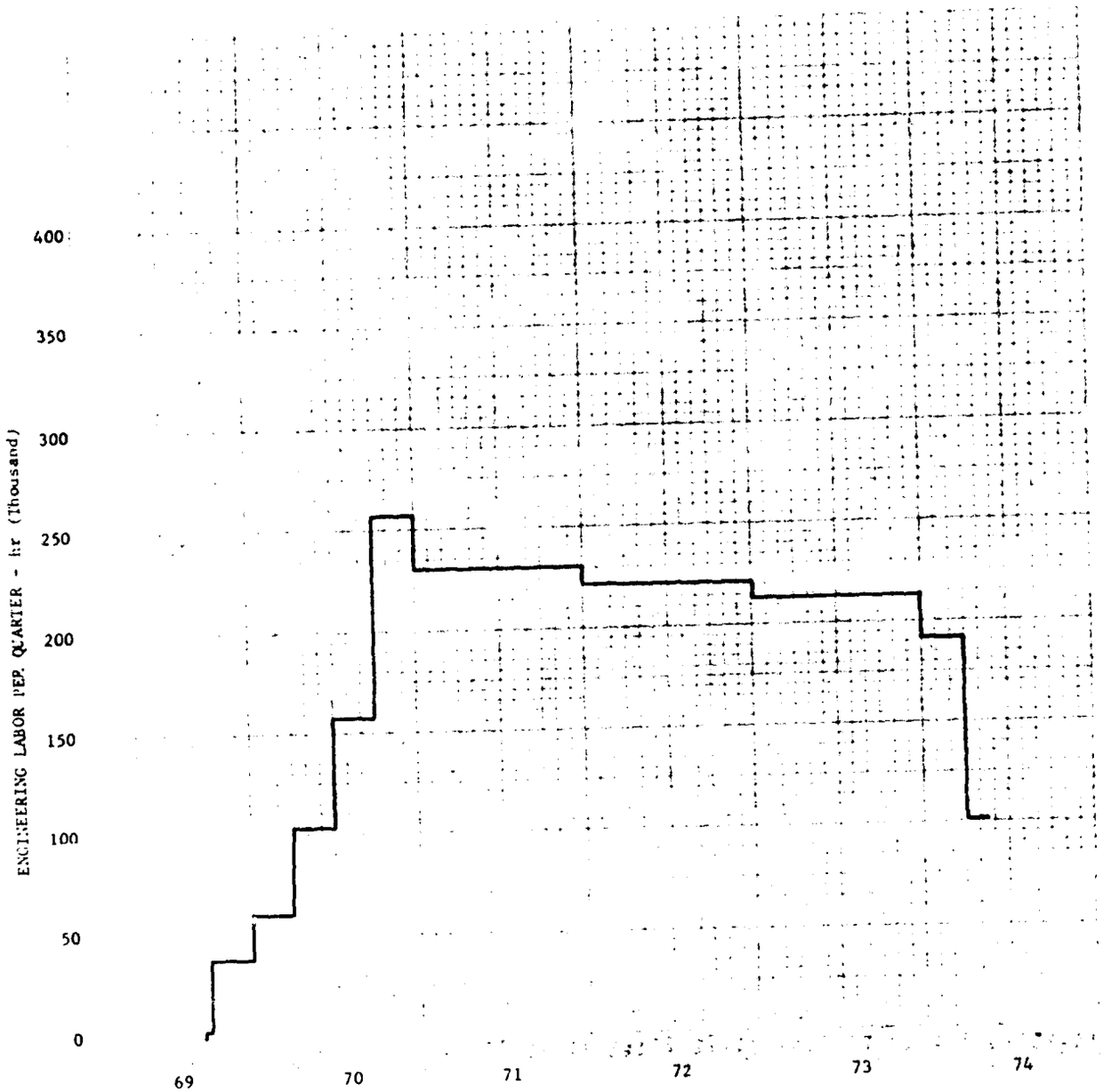


FORMAT B, LEVEL I, PHASE IV - TOTAL LABOR HOURS

662608
FD 17785

TABULATION FOR FORMAT B
LEVEL II - JTF17A-21 ENGINE
ENGINEERING LABOR HOURS
PHASE IV
(STRAIGHT TIME HOURS)

Calendar Year	Quarter	Item 1.0	Item 2.0	Item 3.0	Total
1969	3	4,440	1,200		5,640
	4	39,408	1,200		40,608
		43,848	2,400		46,248
1970	1	60,518	16,295		76,813
	2	102,856	16,296		119,152
	3	157,506	16,296	752	174,554
	4	256,952	16,296	4,512	277,760
		577,832	65,183	5,264	648,279
1971	1	230,429	34,200	9,024	273,653
	2	230,428	34,201	9,024	273,653
	3	230,428	34,201	9,024	273,653
	4	230,426	34,202	9,024	273,652
		921,711	136,804	36,096	1,094,611
1972	1	221,811	34,200	9,024	265,035
	2	221,810	34,201	9,024	265,035
	3	221,810	34,201	9,024	265,035
	4	221,809	34,202	9,024	265,035
		887,240	136,804	36,096	1,060,140
1973	1	213,193	34,200	9,024	256,417
	2	213,192	34,201	9,024	256,417
	3	213,192	34,201	9,024	256,417
	4	213,191	34,202	9,024	256,417
		852,768	136,804	36,096	1,025,668
1974	1	190,914	33,479	9,024	233,417
	2	100,112	16,738	4,512	121,362
		291,026	50,217	13,536	354,779
Total		3,574,425	528,212	127,088	4,229,725



FORMAT B, LEVEL II, PHASE IV - ENGINEERING HOURS
(1.0 COMPONENT DEVELOPMENT)

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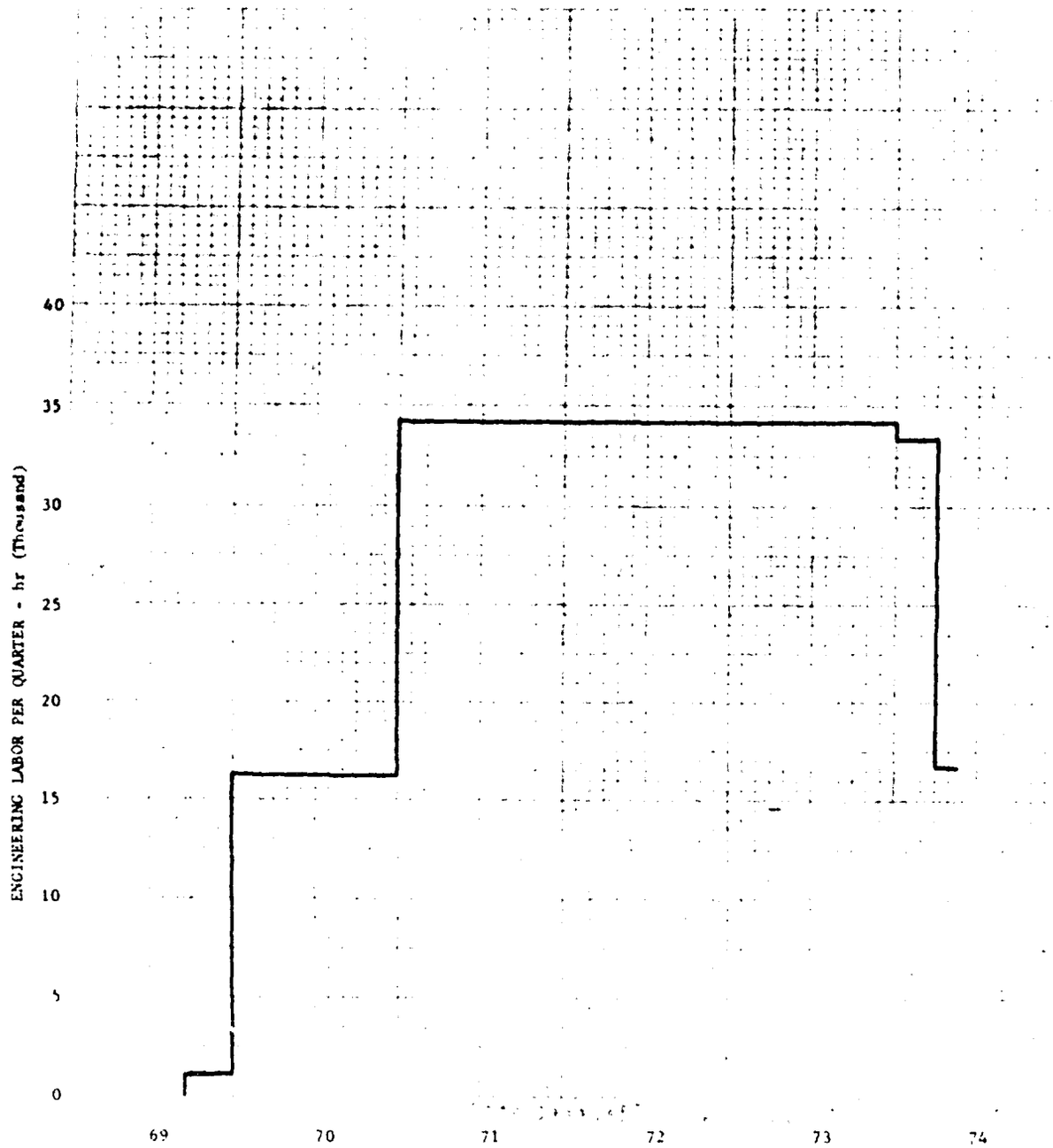
FD 17786



FORMAT B, LEVEL II, PHASE IV - ENGINEERING HOURS
(2.0 ENGINE DEVELOPMENT)

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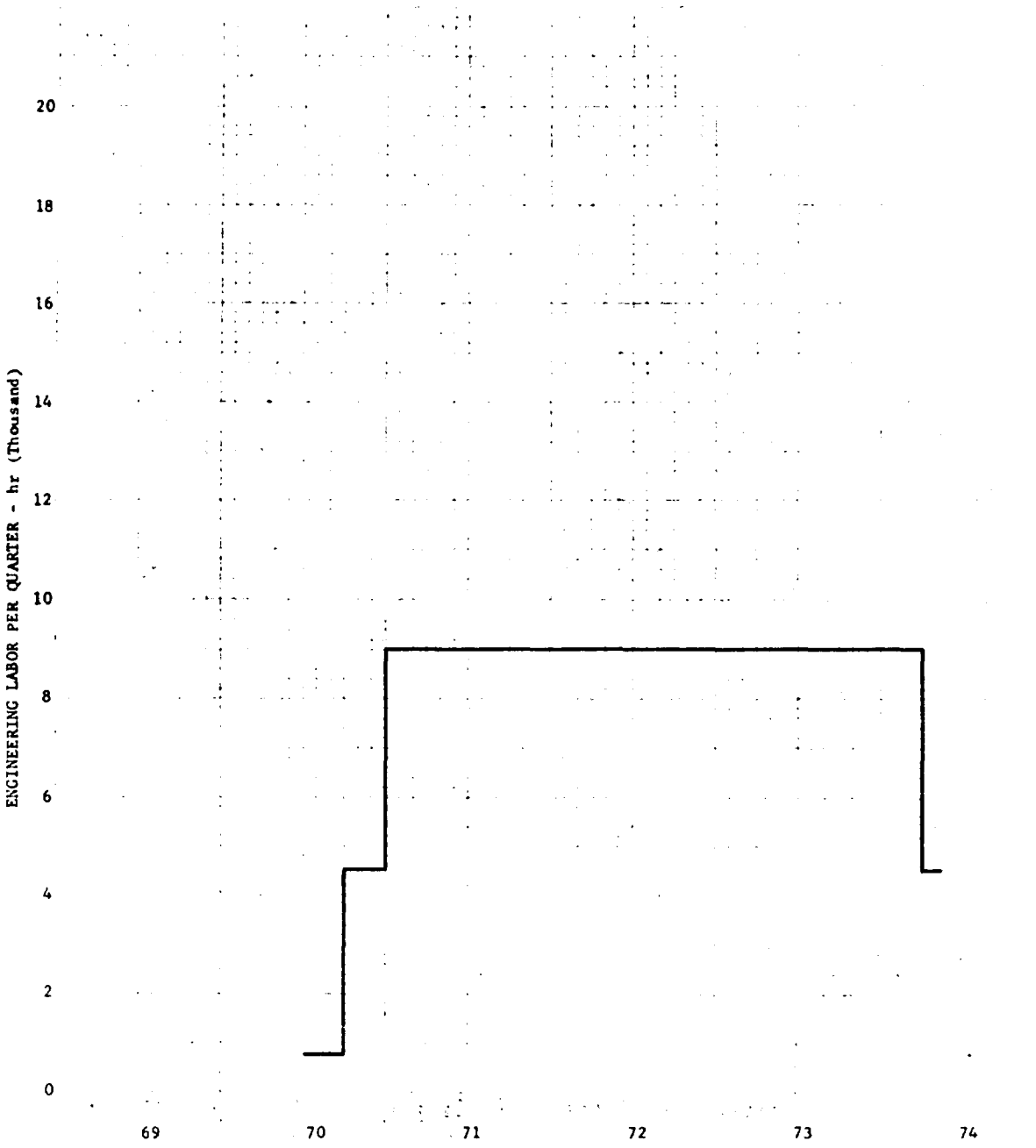
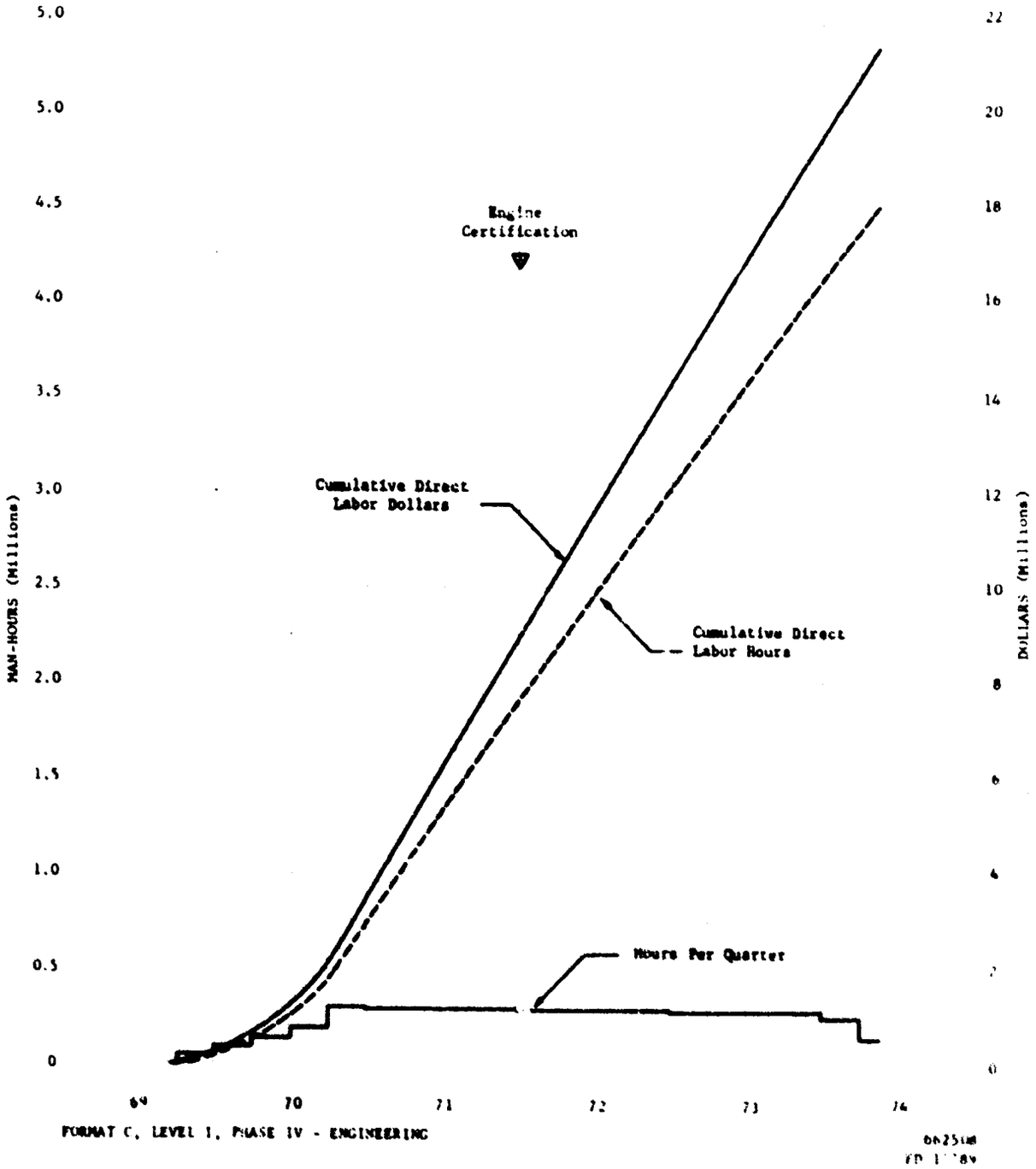


FORMAT B, LEVEL II, PHASE IV - ENGINEERING HOURS
(3.0 DESIGN SUPPORT AND INTEGRATION)

662508
FD 17788

TABULATION FOR FORMAT C
LEVEL 1 - JTF17A-21 ENGINE
ENGINEERING LABOR
PHASE IV
(DOLLAR AMOUNTS ARE IN THOUSANDS)

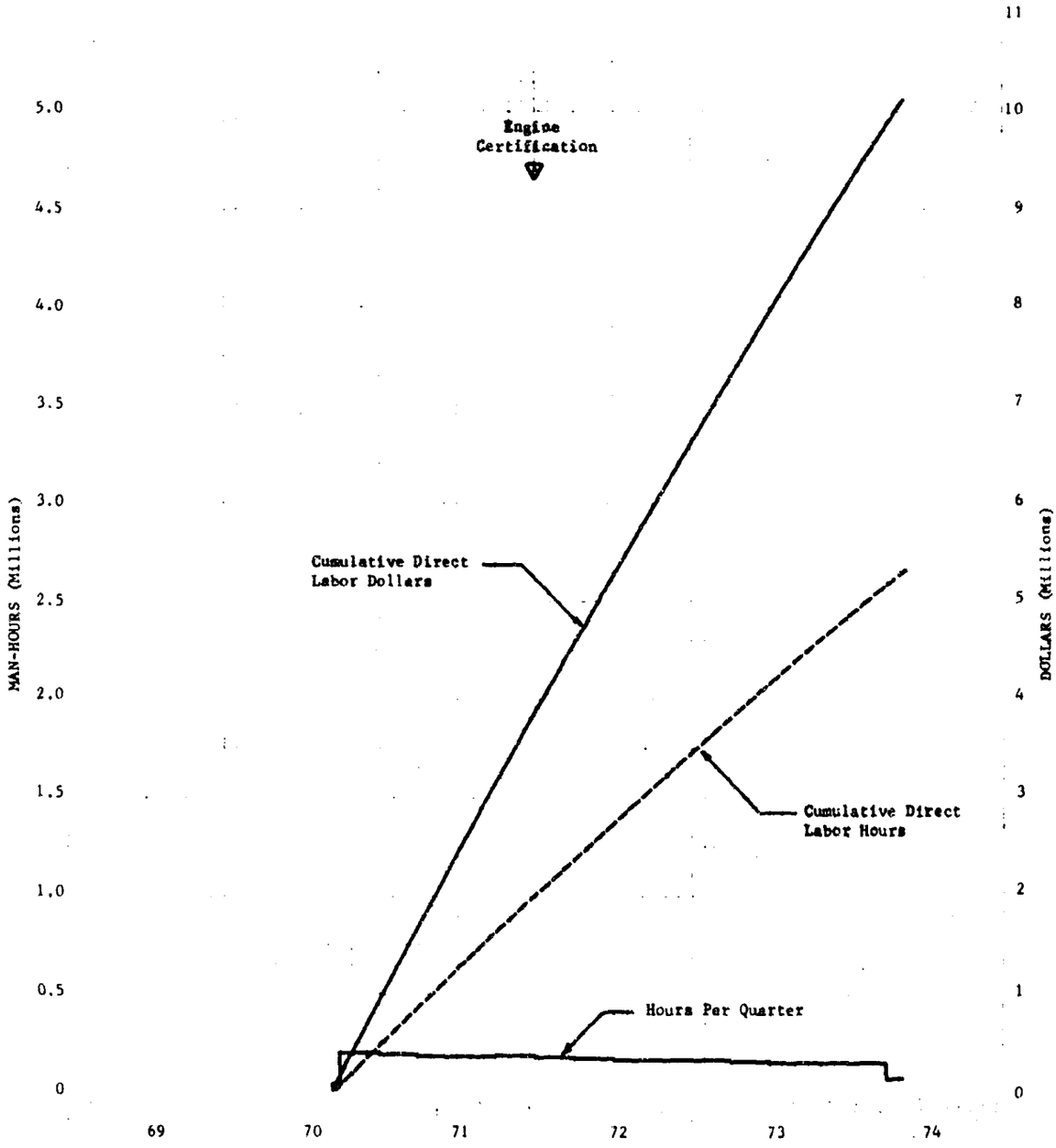
Calendar Year	Quarter	Hours	Cumulative Hours	Amount	Cumulative Amount
1969	3	6,000	6,000	$ 29	$ 29
	4	43,200	49,200	200	229
		49,200		$ 229	
1970	1	81,716	130,916	$ 380	$ 609
	2	126,758	257,674	593	1,202
	3	185,696	443,370	872	2,074
	4	295,488	738,858	1,397	3,471
		689,658		$ 3,242	
1971	1	291,120	1,029,978	$ 1,378	$ 4,849
	2	291,120	1,321,098	1,378	6,227
	3	291,120	1,612,218	1,378	7,605
	4	291,120	1,903,338	1,378	8,983
		1,164,480		$ 5,512	
1972	1	281,952	2,185,290	$ 1,337	$10,320
	2	281,952	2,467,242	1,336	11,656
	3	281,952	2,749,194	1,336	12,992
	4	281,952	3,031,146	1,337	14,329
		1,127,808		$ 5,346	
1973	1	272,784	3,303,930	$ 1,294	$15,623
	2	272,784	3,576,714	1,295	16,918
	3	272,784	3,849,498	1,295	18,213
	4	272,784	4,122,282	1,294	19,507
		1,091,136		$ 5,178	
1974	1	248,316	4,370,598	$ 1,178	$20,685
	2	129,108	4,499,706	613	21,298
		377,424		$ 1,791	
Total Phase IV		4,499,706		$21,298	



FORMAT C, LEVEL 1, PHASE IV - ENGINEERING

TABULATION FOR FORMAT C
LEVEL 1 - JTF17A-21 ENGINE
TEST LABOR
PHASE IV
(DOLLAR AMOUNTS ARE IN THOUSANDS)

Calendar Year	Quarter	Hours	Cumulative Hours	Amount	Cumulative Amount
1969	3				
	4				
1970	1				
	2				
	3	36,240	36,240	$ 138	$ 138
	4	199,977	236,217	762	900
		236,217		$ 900	
1971	1	195,495	431,712	$ 745	$ 1,645
	2	194,824	626,536	742	2,387
	3	193,479	820,015	737	3,124
	4	194,817	1,014,832	743	3,867
		778,615		$ 2,967	
1972	1	183,000	1,197,832	$ 697	$ 4,564
	2	179,000	1,376,832	682	5,246
	3	178,571	1,555,403	680	5,926
	4	178,010	1,733,413	678	6,604
		718,581		$ 2,737	
1973	1	177,279	1,910,692	$ 676	$ 7.280
	2	173,279	2,083,971	660	7,940
	3	171,934	2,255,905	655	8,595
	4	171,279	2,427,184	653	9,248
		693,771		$ 2,644	
1974	1	160,028	2,587,212	$ 609	$ 9,857
	2	78,323	2,665,535	299	10,156
		238,351		$ 908	
Total Phase IV		2,665,535		$10,156	

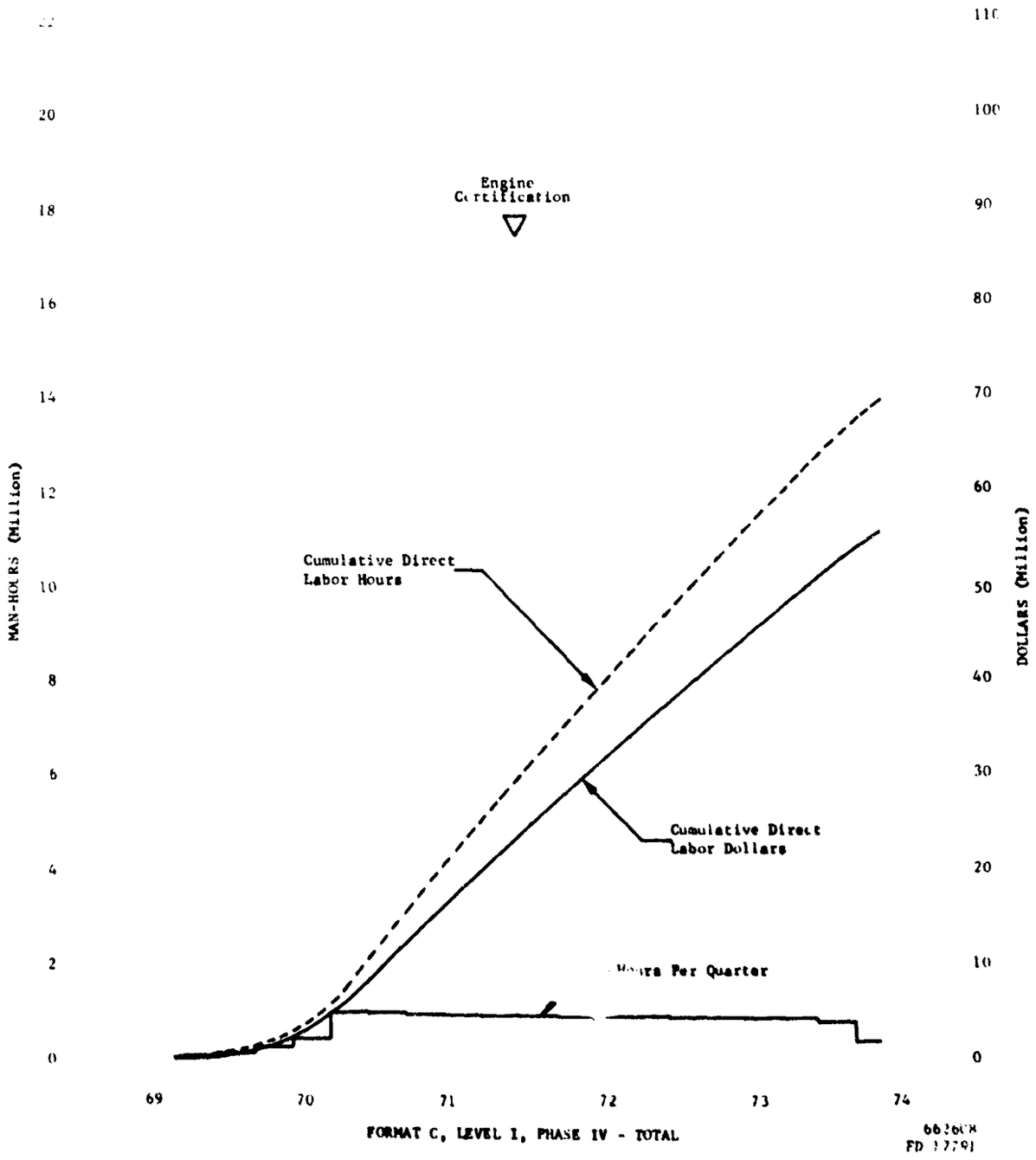


FORMAT C, LEVEL I, PHASE IV - TEST

662508
FD 17790

TABULATION FOR FORMAT C
LEVEL 1 - JTF17A-21 ENGINE
TOTAL LABOR
PHASE IV
(DOLLAR AMOUNTS ARE IN THOUSANDS)

Calendar Year	Quarter	Hours	Cumulative Hours	Amount	Cumulative Amount
1969	3	14,659	14,659	$ 60	$ 60
	4	101,940	116,599	409	469
		116,599		$ 469	
1970	1	177,187	293,786	$ 721	$1,190
	2	283,160	576,946	1,151	2,341
	3	467,908	1,044,854	1,887	4,228
	4	997,210	2,042,064	3,947	8,175
		1,925,465		$7,706	
1971	1	998,893	3,040,957	$3,949	$12,124
	2	967,839	4,008,796	3,839	15,963
	3	953,699	4,962,495	3,788	19,751
	4	931,170	5,893,665	3,708	23,459
		3,851,601		$15,284	
1972	1	879,513	6,773,178	$ 3,513	$26,972
	2	863,203	7,636,381	3,453	30,425
	3	888,641	8,525,022	3,543	33,968
	4	879,244	9,404,266	3,509	37,477
		3,510,601		$14,018	
1973	1	839,261	10,243,527	$ 3,357	$40,834
	2	835,260	11,078,787	3,341	44,175
	3	830,187	11,908,974	3,323	47,498
	4	823,671	12,732,645	3,300	50,798
		3,328,379		$13,321	
1974	1	750,630	13,483,275	$ 3,008	$53,806
	2	366,813	13,850,088	1,480	55,286
		1,117,443		$ 4,488	
Total Phase IV		13,850,088		$55,286	



FORMAT C, LEVEL I, PHASE IV - TOTAL

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SUMMARY FORMAT A
PHASE V
POST AIRCRAFT CERTIFICATION
SUSTAINING ENGINEERING
(DOLLAR AMOUNTS ARE IN THOUSANDS)

Level II

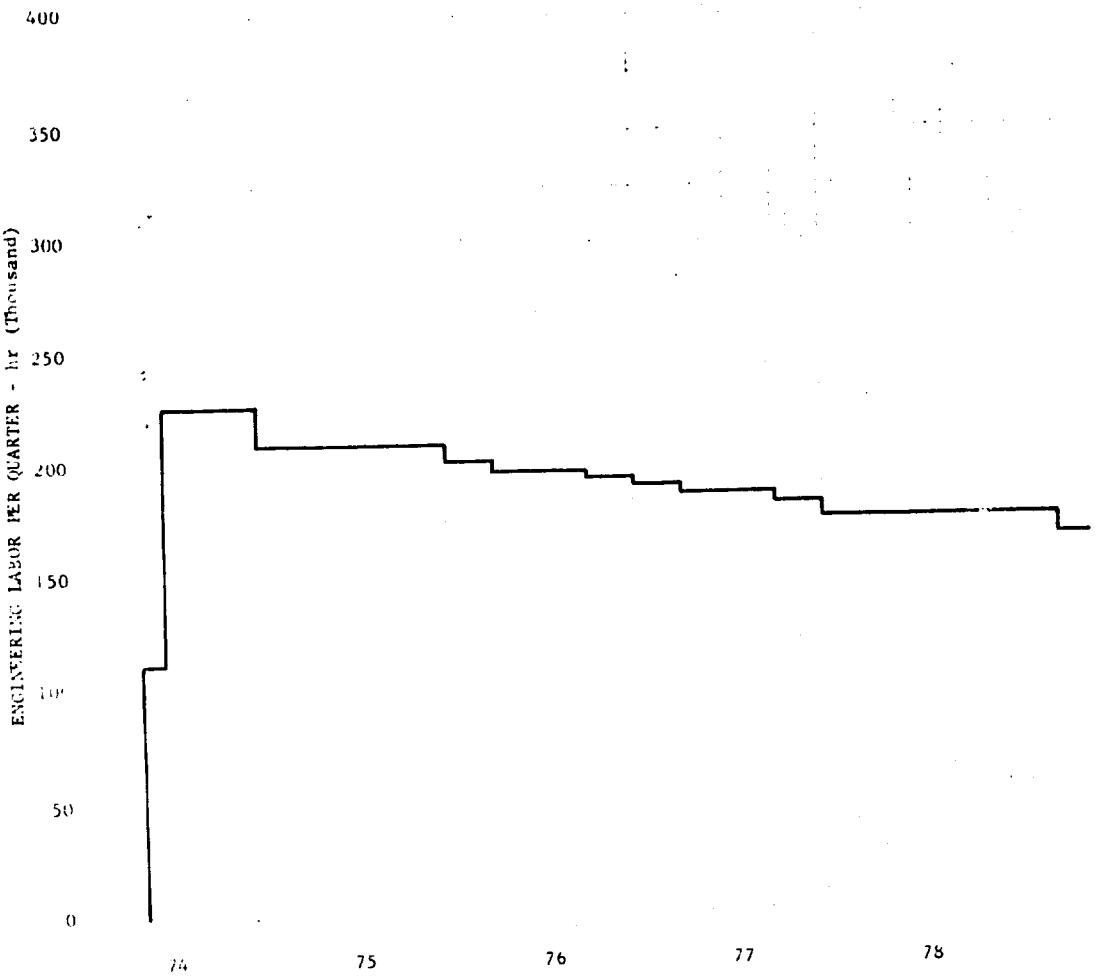
I	ENGINEERING		
	Direct Labor	Hrs.	4,208,720
	Direct Labor	Amt.	$ 19,955
	Overhead	"	22,350
	Subcontracted Effort	"	
	Overtime Premium	"	599
	Materials	"	1,245
	Other Direct Charges	"	1,314
	TOTAL ENGINEERING	"	$ 45,463
II	TESTING		
	Direct Labor	Hrs.	2,246,381
	Direct Labor	Amt.	$ 8,559
	Overhead	"	9,586
	Subcontracted Effort	"	
	Overtime Premium	"	257
	Materials	"	14,897
	Other Direct Charges	"	605
	TOTAL TESTING	"	$ 33,904
III	TOOLING		
	Direct Labor	Hrs.	188,100
	Direct Labor	Amt.	$ 708
	Overhead	"	792
	Subcontracted Effort	"	
	Overtime Premium	"	21
	Materials	"	2,829
	Other Direct Charges	"	
	TOTAL TOOLING	"	$ 4,350
IV	FABRICATION-CONSTRUCTION		
	Direct Labor	Hrs.	2,000,006
	Direct Labor	Amt.	$ 7,140
	Overhead	"	7,997
	Subcontracted Effort	"	
	Overtime Premium	"	214
	Materials	"	51,798
	Other Direct Charges	"	
	TOTAL FABRICATION-CONST	"	$ 67,149
V	QUALITY CONTROL		
	Direct Labor	Hrs.	521,499
	Direct Labor	Amt.	$ 1,809
	Overhead	"	2,027
	Subcontracted Effort	"	
	Overtime Premium	"	54
	Materials	"	250
	Other Direct Charges	"	
	TOTAL QUALITY CONTROL	"	$ 4,140
VI	OTHER EFFORT-ASSEMBLY		
	Direct Labor	Hrs.	1,461,520
	Direct Labor	Amt.	$ 5,218
	Overhead	"	5,844
	Subcontracted Effort	"	
	Overtime Premium	"	156
	Materials	"	
	Other Direct Charges	"	
	TOTAL OTHER EFFORT-ASSY	"	$ 11,218
	TOTAL DIRECT COST		$ 166,224
VII	GEN'L & ADMIN EXPENSE		14,212
	TOTAL COST		$ 180,436

VIII LABOR AND OVERHEAD RATES

Refer to Section VI, Format D (Labor Rates) and Section IX (Overhead Rates).

TABULATION FOR FORMAT B
LEVEL II - POST AIRCRAFT CERTIFICATION
SUSTAINING ENGINEERING
PHASE V
(STRAIGHT TIME HOURS)

Calendar Year	Quarter	Engineering	Test	Tooling	Construction	Quality	Assembly	Total
1974	2	113,748	73,646	5,782	60,834	16,748	52,414	323,172
	3	227,495	148,421	11,413	121,666	33,498	104,829	647,322
	4	227,495	148,421	11,413	121,666	33,498	104,829	647,322
		568,733	370,488	28,608	304,166	83,744	262,072	1,617,816
1975	1	210,259	133,950	11,108	118,301	32,532	101,069	607,219
	2	210,259	130,190	10,803	114,935	31,567	101,069	598,823
	3	210,259	125,646	10,499	111,570	30,602	86,630	575,206
	4	210,259	121,260	10,195	108,206	29,639	86,630	566,189
		841,036	511,046	42,605	453,012	124,340	375,398	2,347,437
1976	1	202,739	115,338	10,073	106,989	28,138	72,192	535,469
	2	198,979	108,814	9,951	105,772	26,637	72,192	522,345
	3	198,979	103,180	9,829	104,554	25,136	57,754	499,432
	4	195,219	99,170	9,710	103,341	23,639	57,754	488,833
		795,916	426,502	39,563	420,656	103,550	259,892	2,046,079
1977	1	191,459	85,292	9,478	100,834	23,622	57,754	468,439
	2	187,699	85,292	9,246	98,327	23,605	57,754	461,923
	3	187,699	85,291	9,014	95,820	23,588	57,754	459,166
	4	183,939	85,070	8,781	93,317	23,575	57,754	452,436
		750,796	340,945	36,519	388,298	94,390	231,016	1,841,964
1978	1	176,419	82,095	8,008	85,112	21,224	43,315	416,173
	2	176,419	82,095	7,234	76,908	18,873	43,315	404,844
	3	176,419	82,090	6,461	68,704	16,522	43,315	393,511
	4	176,419	81,467	5,687	60,499	14,173	43,315	381,560
		705,676	327,747	27,390	291,223	70,792	173,260	1,596,088
1979	1	176,419	80,923	1,917	20,385	12,052	43,315	335,011
	2	117,613	53,947	213	2,265	1,340	28,877	204,255
		294,032	134,870	2,130	22,650	13,392	72,192	539,266
Total Phase V		3,956,194	2,111,598	176,815	1,880,005	490,208	1,373,830	9,988,650



FORMAT B, LEVEL II, PHASE V (ENGINEERING LABOR HOURS)

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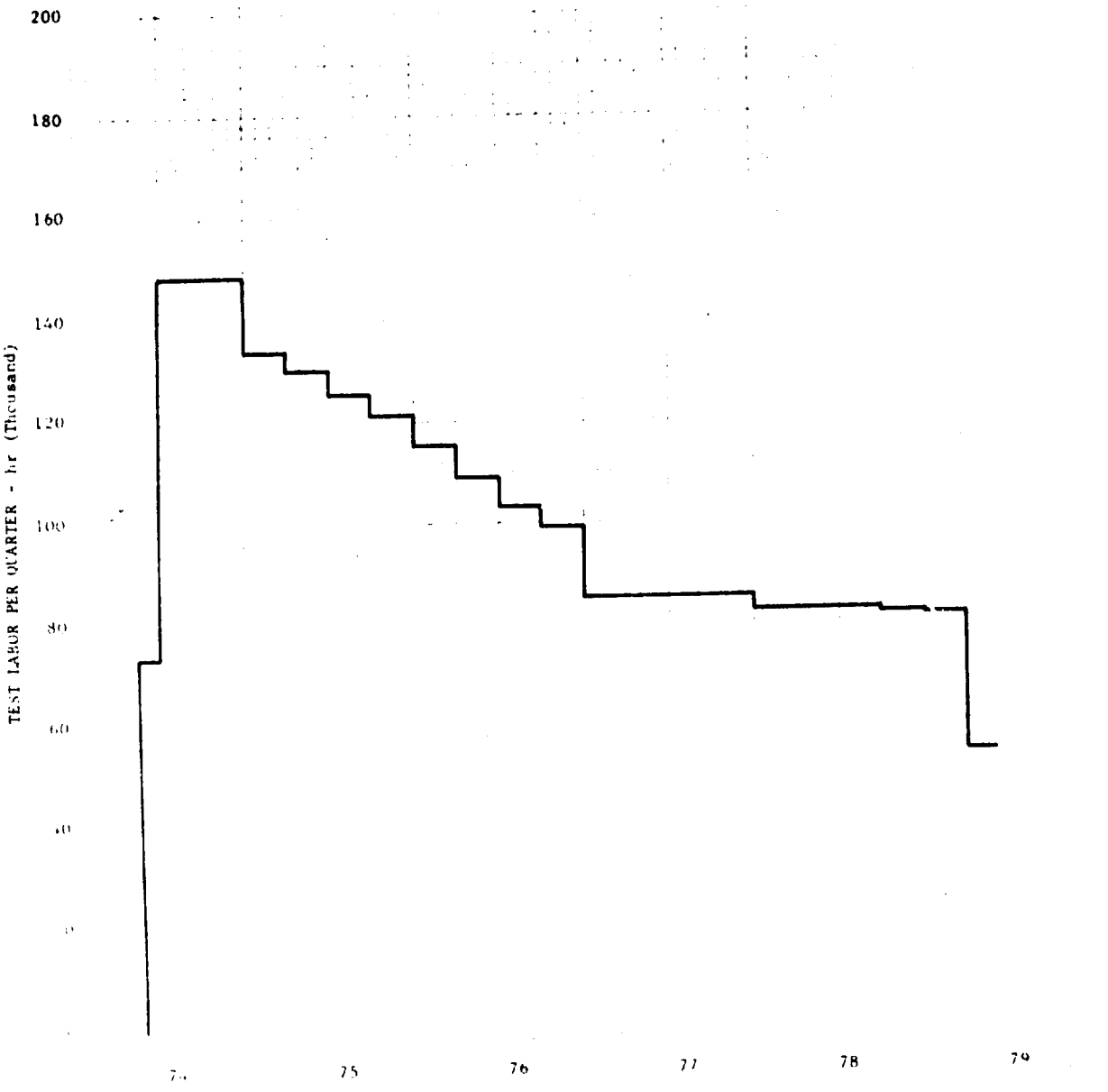

FORCAT B, LEVEL II, PHASE V (TEST LABOR HOURS)

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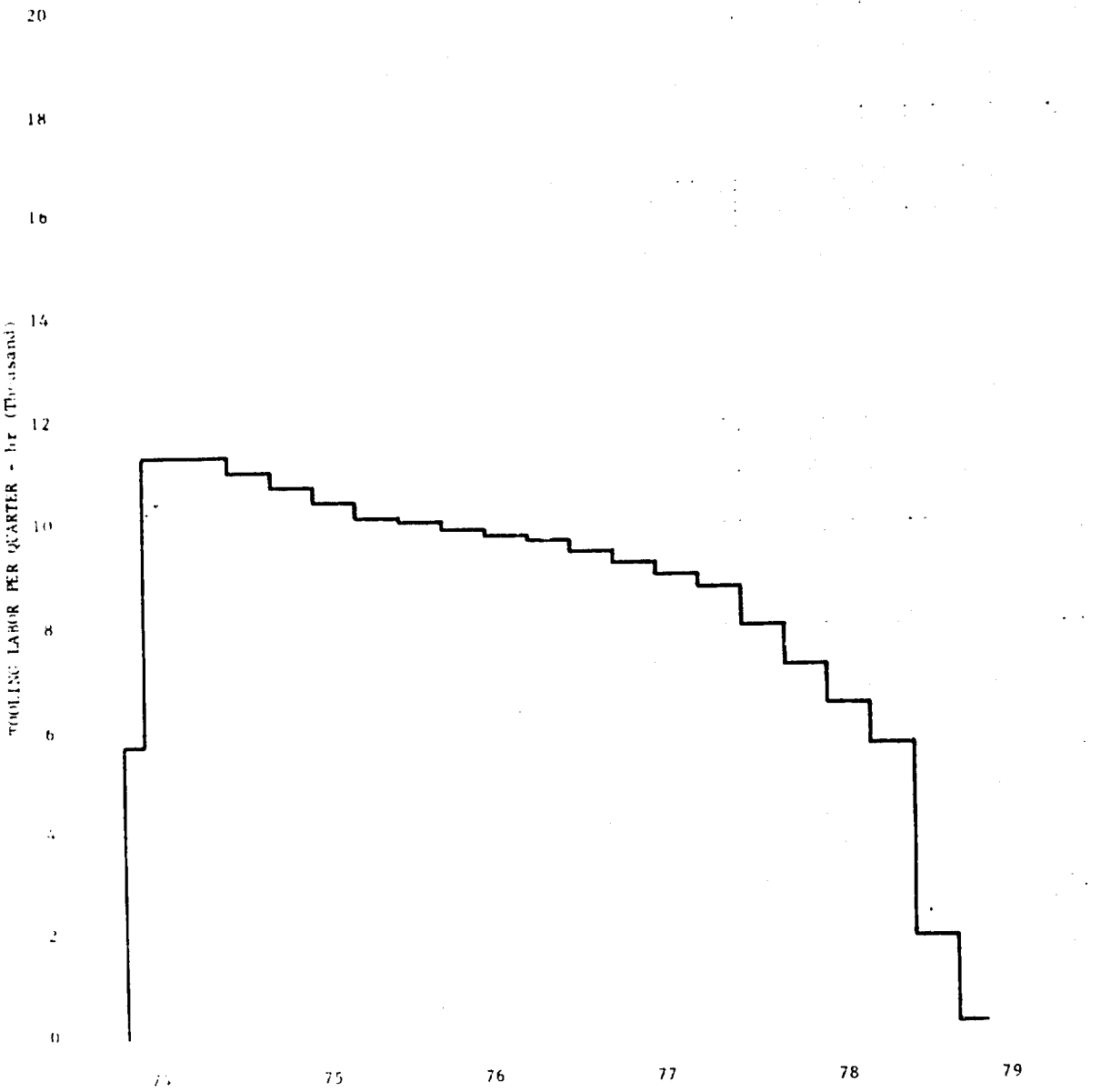
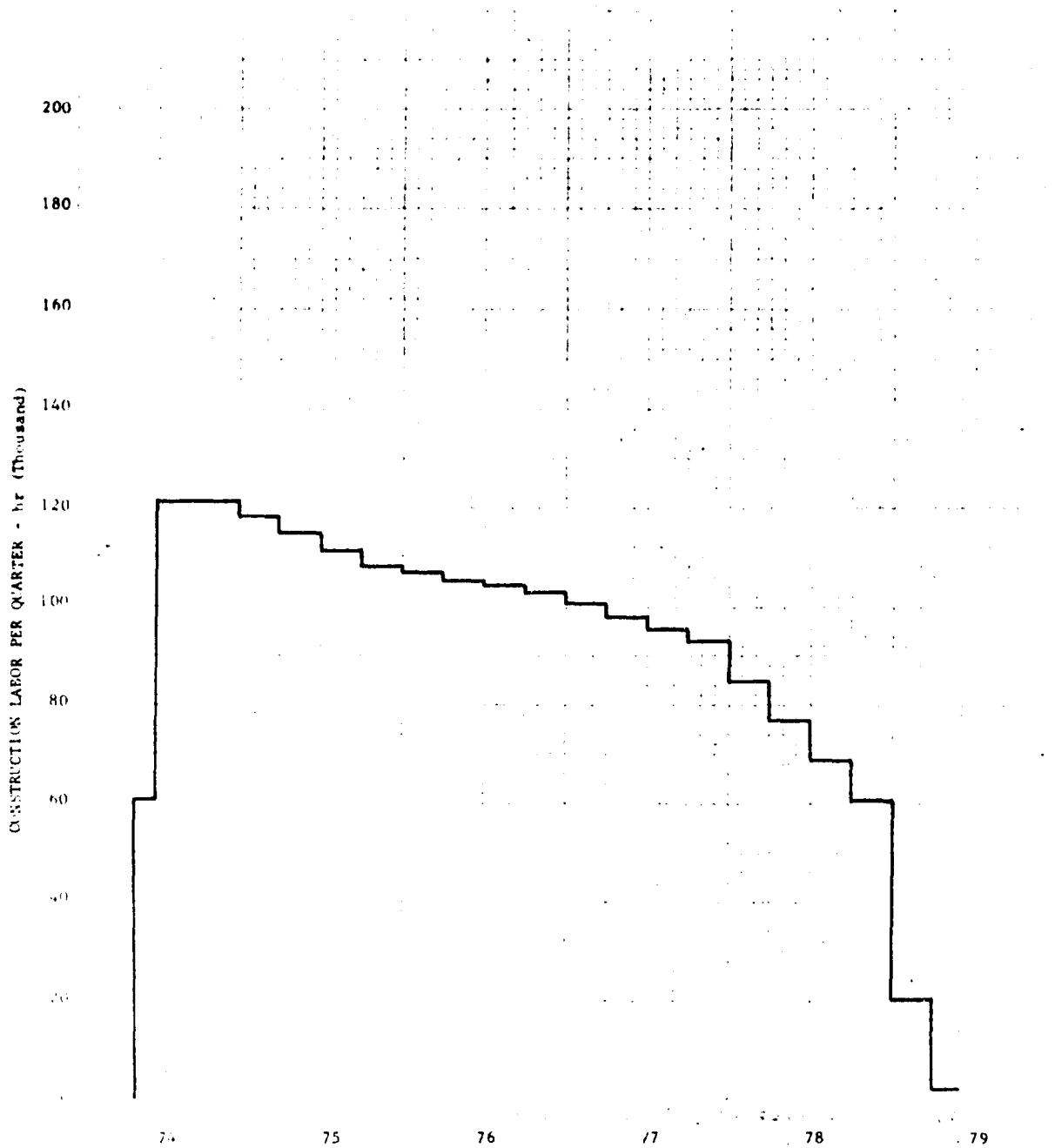
FD 17794



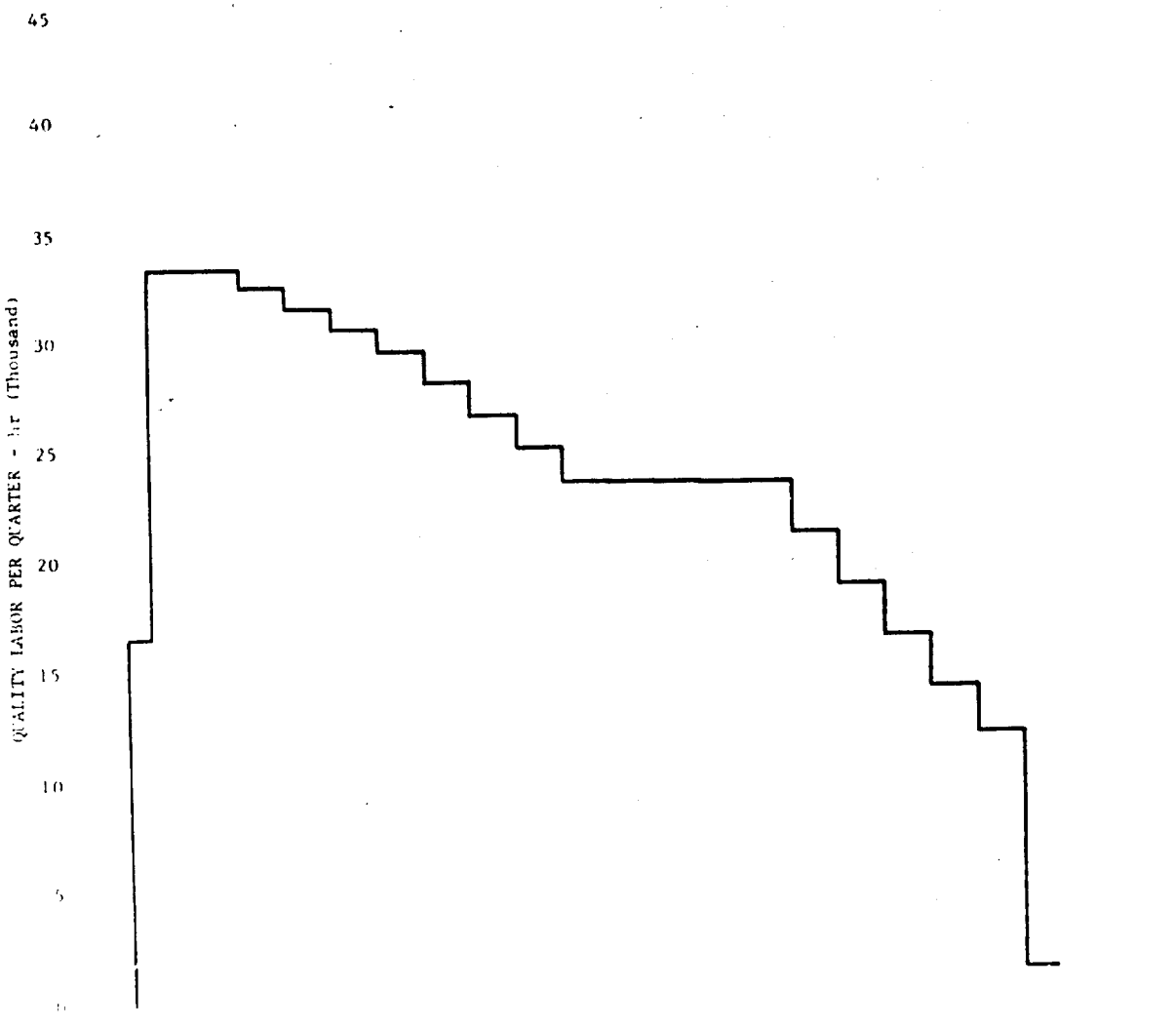
FORMAT B, LEVEL II, PHASE V (TOOLING LABOR HOURS)

662508
FD 17795

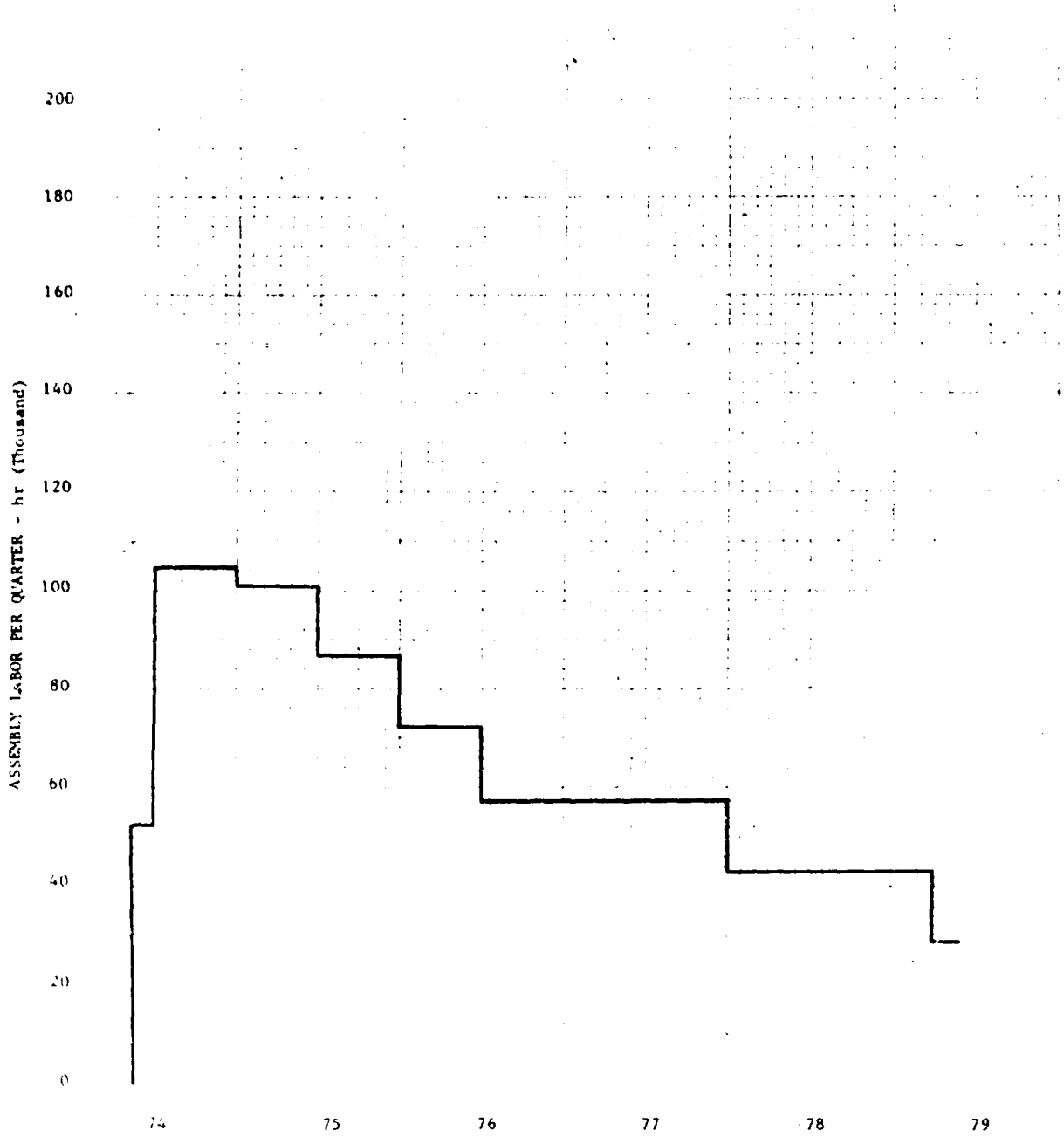


FORMAT B, LEVEL II, PHASE V (CONSTRUCTION LABOR HOURS)

662508
FD 17796

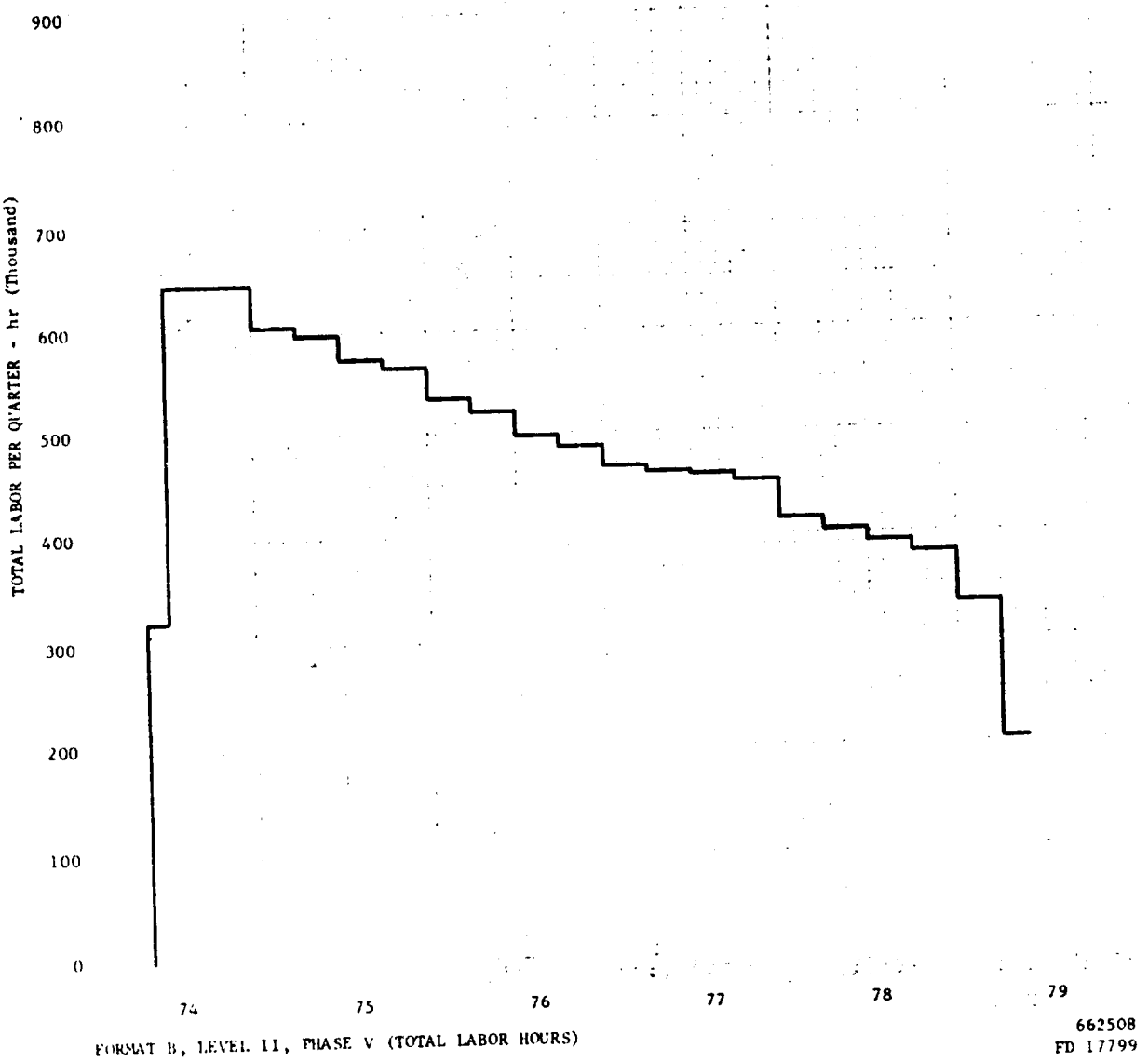


FORMAT B, LEVEL II, PHASE V (QUALITY LABOR HOURS)



FORMAT B, LEVEL II, PHASE V (ASSEMBLY LABOR HOURS)

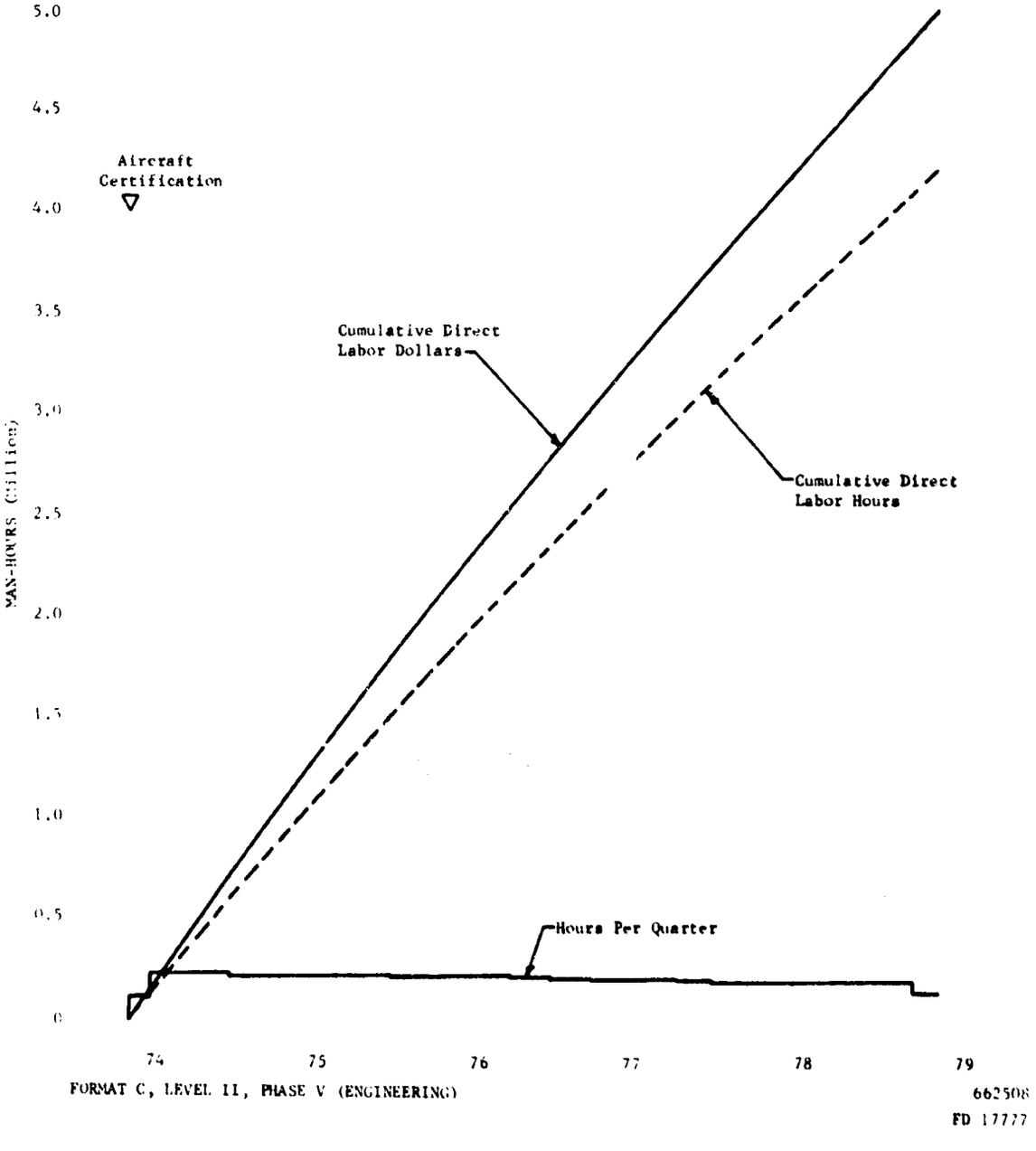
662508
FD 17798



FORMAT B, LEVEL II, PHASE V (TOTAL LABOR HOURS)

TABULATION FOR FORMAT C
LEVEL II - POST AIRCRAFT CERTIFICATION
SUSTAINING ENGINEERING
ENGINEERING LABOR
PHASE V
(DOLLAR AMOUNTS ARE IN THOUSANDS)

Calendar Year	Quarter	Hours	Cumulative Hours	Amount	Cumulative Amount
1974	2	121,008	121,008	$ 574	$ 574
	3	242,016	363,024	1,147	1,721
	4	242,016	605,040	1,147	2,868
		605,040		$ 2,868	
1975	1	223,680	828,720	$ 1,063	3,931
	2	223,680	1,052,400	1,063	4,994
	3	223,680	1,276,080	1,064	6,058
	4	223,680	1,499,760	1,064	7,122
		894,720		$ 4,254	
1976	1	215,680	1,715,440	$ 1,024	8,146
	2	211,680	1,927,120	1,005	9,151
	3	211,680	2,138,800	1,005	10,156
	4	207,680	2,346,480	985	11,141
		846,720		$ 4,019	
1977	1	203,680	2,550,160	$ 966	12,107
	2	199,680	2,749,840	946	13,053
	3	199,680	2,949,520	946	13,999
	4	195,680	3,145,200	927	14,926
		798,720		$ 3,785	
1978	1	187,680	3,332,880	$ 887	15,813
	2	187,680	3,520,560	887	16,700
	3	187,680	3,708,240	888	17,588
	4	187,680	3,895,920	888	18,476
		750,720		$ 3,550	
1979	1	187,680	4,083,600	$ 887	19,363
	2	125,120	4,208,720	592	19,955
		312,800		$ 1,479	
Total Phase IV		4,208,720		$19,955	



FORMAT C, LEVEL II, PHASE V (ENGINEERING)

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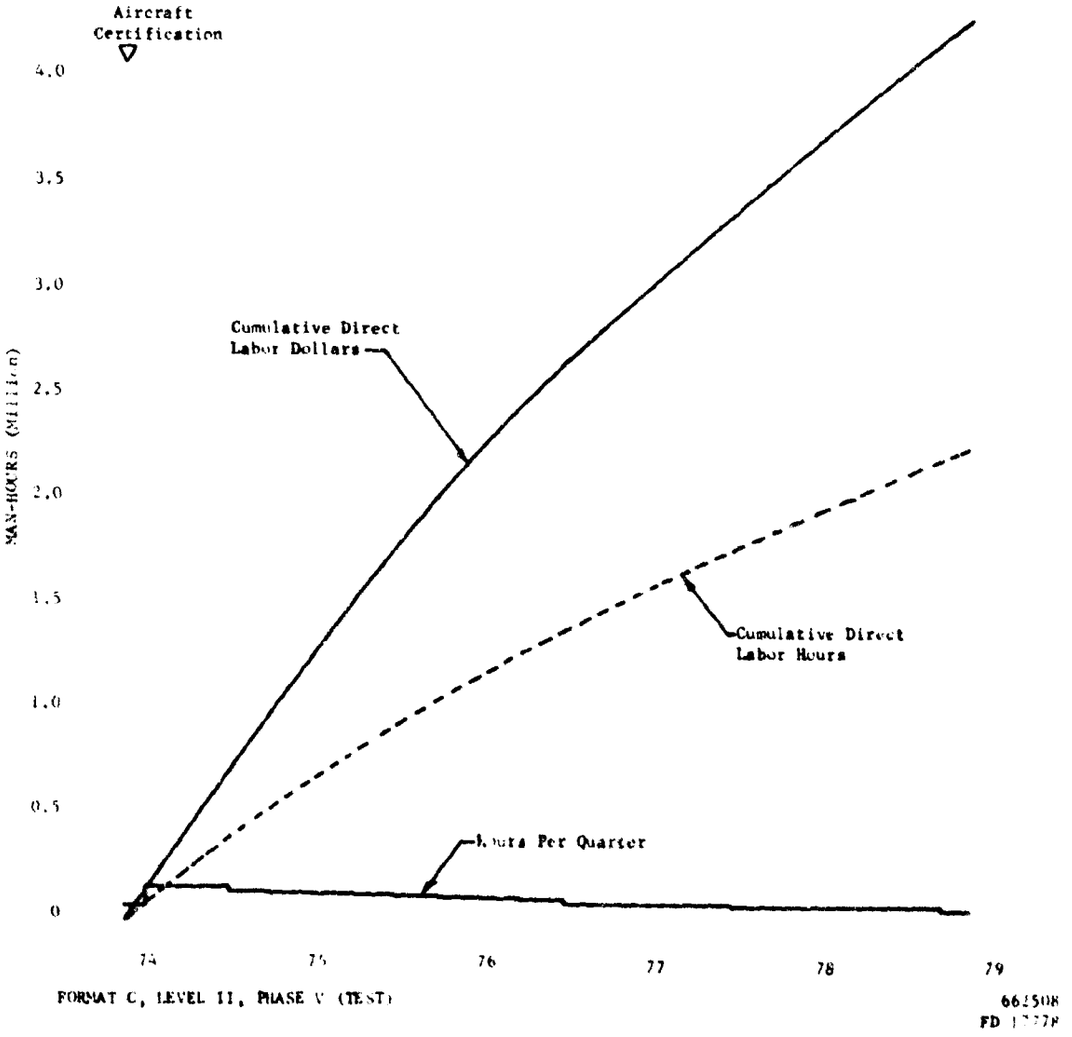
FD 17777

TABULATION FOR FORMAT C
LEVEL II - POST AIRCRAFT CERTIFICATION
SUSTAINING ENGINEERING
TEST LABOR
PHASE V
(DOLLAR AMOUNTS ARE IN THOUSANDS)

Calendar Year	Quarter	Hours	Cumulative Hours	Amount	Cumulative Amount
1974	2	78,347	78,347	$ 299	$ 299
	3	157,895	236,242	601	900
	4	157,895	394,137	602	1,502
		394,137		$1,502	
1975	1	142,500	536,637	$ 543	2,045
	2	138,500	675,137	528	2,573
	3	133,666	808,803	509	3,082
	4	129,000	937,803	491	3,573
		543,666		$2,071	
1976	1	122,700	1,060,503	$ 468	4,041
	2	115,760	1,176,263	441	4,482
	3	109,766	1,286,029	418	4,900
	4	105,500	1,391,529	402	5,302
		453,726		$1,729	
1977	1	90,736	1,482,265	$ 345	5,647
	2	90,736	1,573,001	346	5,993
	3	90,735	1,663,736	346	6,339
	4	90,500	1,754,236	345	6,684
		362,707		$1,382	
1978	1	87,335	1,841,571	$ 333	7,017
	2	87,335	1,928,906	333	7,350
	3	87,330	2,016,236	332	7,682
	4	86,667	2,102,903	330	8,012
		348,667		$1,328	
1979	1	86,088	2,188,991	$ 328	8,340
	2	57,390	2,246,381	219	8,559
		143,478		$ 547	
Total Phase V		2,246,381		$8,559	

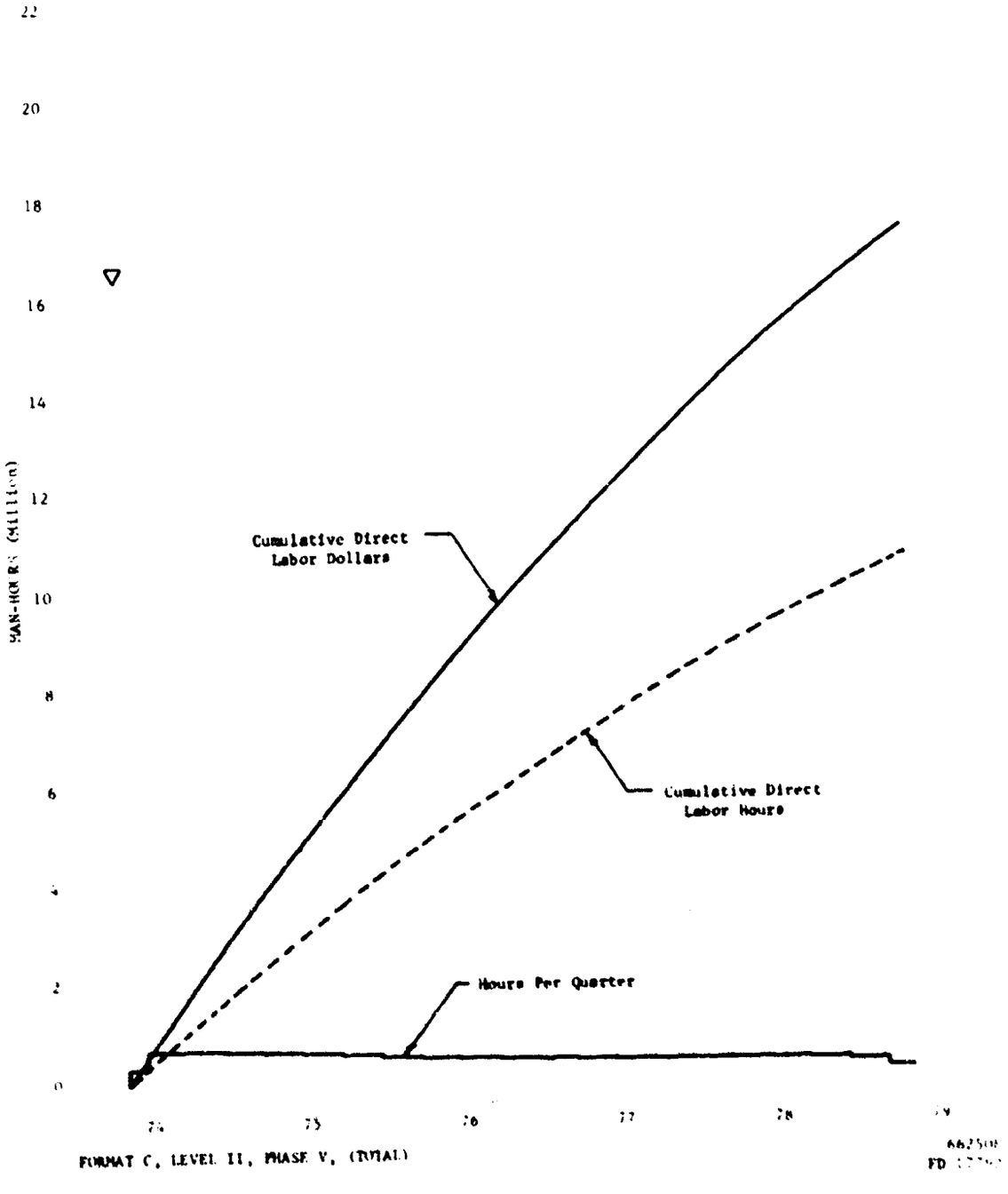


FORMAT C, LEVEL II, PHASE V (TEST)

662508
FD 17778

TABULATION FOR FORMAT C
LEVEL II - POST AIRCRAFT CERTIFICATION
SUSTAINING ENGINEERING
TOTAL LABOR
PHASE V
(DOLLAR AMOUNTS ARE IN THOUSANDS)

Calendar Year	Quarter	Hours	Cumulative Hours	Amount	Cumulative Amount
1974	2	343,800	343,800	$ 1,387	$ 1,387
	3	688,640	1,032,440	2,778	4,165
	4	688,640	1,721,080	2,779	6,944
		1,721,080		$ 6,944	
1975	1	645,978	2,367,058	$ 2,604	$ 9,548
	2	637,047	3,004,105	2,571	12,119
	3	611,922	3,616,027	2,481	14,600
	4	602,330	4,218,357	2,445	17,045
		2,497,277		$10,101	
1976	1	569,648	4,788,005	$ 2,316	$19,361
	2	555,686	5,343,691	2,260	21,621
	3	531,310	5,875,001	2,172	23,793
	4	520,035	6,395,036	2,125	25,918
		2,176,679		$ 8,873	
1977	1	498,339	6,893,375	$ 2,039	$27,957
	2	491,407	7,384,782	2,009	29,966
	3	488,474	7,873,256	1,998	31,964
	4	481,315	8,354,571	1,967	33,931
		1,959,535		$ 8,013	
1978	1	442,738	8,797,309	$ 1,818	$35,749
	2	430,686	9,227,995	1,776	37,525
	3	418,629	9,646,624	1,733	39,258
	4	405,916	10,052,540	1,687	40,945
		1,697,969		$ 7,014	
1979	1	356,394	10,408,934	$ 1,510	$42,455
	2	217,292	10,626,226	934	43,389
		573,686		$ 2,444	
Total Phase V		10,626,226		$43,389	


22
20
18
16
14
12
10
8
6
4
2
0
Cumulative Direct
Labor Dollars
Cumulative Direct
Labor Hours
Hours Per Quarter
76
75
77
78
FORMAT C, LEVEL II, PHASE V, (TOTAL)

DEVELOPMENT OF PRODUCTION ENGINE DIRECT COST ESTIMATES

The production engine cost estimate, as presented on the following pages, was developed through the joint efforts of the Design Value Engineering group and the Manufacturing and Purchasing Departments. The Design Value Engineering group coordinated the estimating effort with Purchasing and Manufacturing supplying most of the necessary data. The production engine cost estimate was based on the production engine configuration as described in Volume III.

Approximately 580 parts plus engine assembly and test were selected to form a basis for the cost estimate. (See Estimated Standard Material and Labor Costs, Schedule A.) The parts involved in the cost estimate were sourced to either the production shop or purchasing in accordance with current Pratt & Whitney Aircraft production sourcing practice. The backup detail used in collecting and recording the cost estimates is available for audit at the Florida Research and Development Center.

Prints of those parts which were to be purchased and required raw material to be purchased were supplied to the Purchasing Department. Price quotations for each item were obtained in production quantities from one to three vendors where time permitted. These quotations were requested on the basis of advanced fabrication techniques consistent with projected SST delivery schedules.

Labor quotations on parts and assemblies sourced to the Manufacturing Department's production shop were obtained from the Production Engineering and Industrial Engineering Departments. Production Engineering supplied planning summaries for the Industrial Engineering estimates of base standard minutes.

Assembly and test labor was based upon a detailed study by Industrial Engineering. Included in the study were initial assembly, green and final tests, associated disassembly and reassembly, and component assembly and test.

The cost estimates provided by the Value Engineering group were based upon the selection of similar parts from current production engines using the shop labor standards and/or recent purchase order prices or vendor quotations. Parts so referenced were from engines such as the JTF14, JT11, TF30, and TF33. Costs and labor times were modified by ratio analysis using known factors for size, complexity, material, machinability, and weldability.

The 580 items represent approximately 90% of the cost of the engine hardware, excluding the usual allowance for incorporation of engineering changes. All of the remaining parts are treated as miscellaneous factors. The miscellaneous factors are based on comparisons with similar engines, TF33-P-7 and TF30, for which standard costs currently exist. The items in the gas generator and controls portion of the JTF17A-21 selected for the cost estimate were matched with their counterparts in the TF33-P-7. The standard costs of these TF33-P-7 parts were then deducted from the total standard cost of the gas generator and controls portion of the

Development of Production Engine Direct Cost Estimates (Continued)

engine leaving a remainder which, when broken down on a Purchased-Material-Labor basis, provides the basis for the miscellaneous items estimated for the JTF17A-21 estimate. The Duct Burner and Exhaust System miscellaneous estimates are derived in the same fashion using the TF30 as the comparison engine.

ESTIMATED STANDARD MATERIAL AND LABOR COSTS
SCHEDULE A

Description	Part Number	Mat'l	UPE	Estimating Source Code A	B	C	D	ENGINE PRIME COST Purchased	Material	Labor Hrs.
								$ 35,408.00	22,849.86	574.32
1. Fan Section										
A - Rotor										
1. Blades										
A - 1st Stage	2118301	1202	44	x				11,000.00		
B - 2nd Stage	2114302	1202	74	x				16,000.00		
2. Disks										
A - 1st Stage	VE 4455	4928	1	x		x			1,725.00	50.00
B - 2nd Stage	VE 4456	1202	1	x		x			2,530.00	30.20
3. Hub and Shaft										
B - Shaft	2120023	1007	1		x	x			6,500.00	90.12
C - Front Coupling	2120022	1010	1	x		x			570.00	9.14
D - Fan Rotor Lock	2116243	1202	1	x		x			197.00	9.13
E - Fan Rotor Cover	2120020	5737	1	x		x			51.25	5.99
F - Lock Ring	2116009	5013	1	x		x			206.00	3.58
4. Spacers Seals and Locks										
A - 1st Stage Disk Seal	VE 4477	4966	1		x		x		190.00	20.00
B - 1st Stage Spacer	VE 4476	4966	1		x		x		370.00	3.70
C - 1st Stage In Support	VE 4475	5667	1		x		x		212.00	10.54
B - Static Structures										
1. Inlet Case										
A - Mount Ring	2115106	4966	1	x		x			3,857.00	130.38
B - Cover Segment	2115107	4966	2	x		x			1,322.00	9.32
C - Case Assembly	2120011		1			x				42.00
2. Fan Cases										
A - 1st Stage	2116010	5013	1	x		x			382.92	27.00
B - 2nd Stage	2115113	4966	1	x		x			626.58	17.70
3. Vane and Shroud Assemblies										
A - 1st Stage								7,808.00		
1 - 1st Vane	2114351	4966	64	x					6.00	1.30
2 - Inner Shroud	2115051	5504	1		x		x		61.70	2.08
3 - Inner Seal	2115112	5013	1	x		x				18.63
4 - 1st Stage Assembly	2116011		1			x				
B - 2nd Stage									385.00	9.30
1 - Inner Vane	2114352	4966	77		x	x			770.00	18.70
2 - Outer Vane	2114353	4966	154		x	x			670.00	11.11
3 - Duct Outer Shroud	2114653	4966	1		x	x			358.77	10.30
4 - 2nd Stage Inner Shrd	2114752	4966	1	x		x			226.22	6.22
5 - 2nd Stage Inner Stop	2115117	4966	2	x		x			330.63	14.90
6 - Duct Inner Shroud	2114753	4966	1	x		x			480.00	8.45
7 - 2nd Stage Outer Shrd	2114652	4966	1		x	x			205.00	5.30
8 - EGV Lock	2115118	4966	2		x	x			535.00	2.50
9 - Splitter Nose	2115120	4966	1	x		x			81.77	6.48
10 - 2nd Stage Shroud	2116012	5013	1	x		x				
								$ 34,000.00	$ 12,361.17	458.06
2. Intermediate Section										
A - Intermediate Case										
1. Outer Case	2114784	4966	1	x		x			4,210.00	72.10
2. Inner Ring	2114791	4966	1	x		x			1,625.00	114.00
3. Inner Ring	2114792	4966	1	x		x			1,380.00	42.40
4. Front Cone	2114793	4966	1	x		x			1,105.00	15.10
5. Rear Cone	2114794	4966	1	x		x			501.00	6.45
6. Thick Inner Strut	2114798	4910	4		x	x			81.00	2.40
7. Thick Outer Strut	2114796	4910	4	x		x			83.00	1.60
8. Thin Inner Strut	2114799	4910	4		x	x			81.00	2.40
9. Thin Outer Strut	2114797	4910	4	x		x			77.00	1.60
10. I. D. Ring	2114795	4966	1		x	x			460.00	43.40
11. Splitter Case Sect	2114604	4910	1		x	x			16.37	11
12. Splitter Case Sect	2114610	4910	1		x	x			11.83	11
13. Splitter Case Sect	2114611	4910	6		x	x			42.40	99
14. Inter Case Assembly	2114790		1			x				138.43
B - Bearings and Supports										
1. No. 1 Bearing	2119551	725	1			x		9400.00		
2. No. 2 Bearing	2119555	725	1			x		750.00		
3. No. 1 Bearing Support	2119635	5013	1			x	x		95.00	2.30
4. No. 2 Bearing Support	2119599	5013	1			x	x		70.00	2.00

ESTIMATED STANDARD MATERIAL AND LABOR COSTS (CONTINUED)
SCHEDULE A

Description	Part Number	Matl	UPE	Estimating Source Code A	B	C	D	ENGINE PRIME COST Purchased	Material	Labor Hrs.
3. High Pressure Compressor Section								$ 29,287.20	$ 34,236.66	868.58
A - Rotor										
1 - Blades										
A - 3rd Stage	2116372	1202	90		x			1,197.00		
B - 4th Stage	2116370	1202	100		x			1,030.00		
C - 5th Stage	2116224	1202	114		x			968.00		
D - 6th Stage	2116564	1003	108		x			757.00		
E - 7th Stage	2116558	1003	110		x			749.00		
F - 8th Stage	2116397	1003	114		x			755.00		
2 - Disks										
A - 3rd Stage	VE 4479	1016	1		x		x		3,310.00	35.38
B - 4th Stage	VE 4480	1016	1		x		x		2,225.00	30.22
C - 5th Stage	VE 4481	1016	1		x		x		3,975.00	47.15
D - 6th Stage	VE 4482	1016	1		x		x		2,225.00	30.33
E - 7th Stage	VE 4483	1016	1		x		x		3,975.00	44.82
F - 8th Stage	VE 4484	1016	1		x		x		2,225.00	32.43
3 - Hubs										
A - Front	2117593	1007	1	x		x			1,215.00	54.48
B - Rear	2116500	1004	1	x		x			5,315.00	74.15
4 - Spacers and Seals										
A - Cone Spacer Rtr	VE 4490	1007	1	x		x			1,200.00	17.16
B - 4th Stage Seal	VE 4485	1007	1		x		x		110.00	7.71
C - 5th Stage Seal	VE 4486	1007	1		x		x		110.00	7.71
D - 6th Stage Seal	VE 4487	1007	1		x		x		110.00	7.71
E - 7th Stage Seal	VE 4488	1007	1		x		x		110.00	7.71
F - 8th Stage Seal	VE 4489	1007	1		x		x		110.00	7.71
5 - Bore Tube										
A - Outer Tube	VE 4491	1003	1		x		x		710.00	8.40
B - Inner Tube	VE 4492	1003	1		x		x		210.00	4.10
C - Bore Tube Assembly	VE 4493		1							.50
B - Static Structures										
1 - Aero Brake										
A - Shroud Inner	2116119	1010	1	x		x			498.17	12.79
B - Unison Ring	2116111	1010	1	x		x			398.85	17.05
C - Vane	2116499	1202	126		x			1,550.00		
2 - Vane and Case Assembly										
A - 3rd Stage										
1 - Case Compr	VE12347	1009	1		x		x		1,300.00	21.50
2 - Shroud Compr	VE12348	1033	1		x		x		12.30	.34
3 - Vane	VE12349	1009	104		x			2,641.60		
4 - Inner Shroud	VE12350	1009	1		x		x		174.00	6.75
5 - Ring-Air Seal Assy	VE12351		1		x			730.00		
6 - Vane and Case Assy	VE12346		1				x			46.47
7 - Ring-Air Seal Assy	VE12358		1		x			780.00		
B - 4th Stage										
1 - Case Compr	2115815	1009	1		x		x		1,109.78	18.28
2 - Shroud Compr	2115816	1033	1		x	x			11.80	.34
3 - Vane	2115028	1009	136		x			2,964.00		
4 - Inner Shroud	2115842	1009	1		x	x			174.00	6.82
5 - Ring-Air Seal Assy	2115820		1	x				582.00		
6 - Vane and Case Assy	2115814		1			x				52.85
7 - Ring-Air Seal Assy	2115817		1	x				760.00		
C - 5th Stage										
1 - Case Compr	2115824	1009	1	x		x			853.60	18.28
2 - Shroud Compr	2115825	1033	1		x		x		11.30	.34
3 - Vane	2115026	1009	150	x				2,850.00		
4 - Inner Shroud	2115843	1009	1		x	x			142.00	6.83
5 - Ring-Air Seal Assy	2115829		1	x				570.00		
6 - Vane and Case Assy	2115823		1			x				55.35
7 - Ring-Air Seal Assy	2115826		1	x				634.00		
D - 6th Stage										
1 - Case Compr	2115833	1009	1	x		x			794.54	18.28
2 - Shroud Compr	2115834	1033	1		x	x			10.80	.34
3 - Vane	2115037	1009	138		x			2,359.00		
4 - Inner Shroud	2115844	1009	1		x	x			158.00	6.83
5 - Ring-Air Seal Assy	2115838		1	x				613.00		
6 - Vane and Case Assy	2115832		1			x				53.50
7 - Ring-Air Seal Assy	2115835		1		x			593.00		

ESTIMATED STANDARD MATERIAL AND LABOR COSTS (CONTINUED)
SCHEDULE A

Description	Part Number	Matl	UPE	Estimating Source Code A	B	C	D	ENGINE PRIME COST Purchased	Material	Labor Hrs.
3. High Pressure Compressor Section										
E - 7th Stage										
1 - Case Compr	VE12353	1009	1		x		x		$ 738.00	16.83
2 - Shroud Compr	VE12354	1033	1		x		x		10.50	.34
3 - Vane	VE12355	1009	120		x			1,944.00		
4 - Inner Shroud	VE12356	1009	1		x		x		158.00	6.75
5 - Ring-Air Seal Assy	VE12357		1			x		730.00		
6 - Vane and Case Assy	VE12352		1				x			50.82
7 - Ring-Air Seal Assy	VE12359		1		x			725.00		
3 - Exit Guide Vanes										
A - Vane	2116441	1010	120	x		x		690.00		
B - Vane	2116442	1010	120	x		x		705.60		
C - Shroud Com Stator	2116443	1010	1	x		x			205.54	19.30
D - Shroud Com Stator	2116440	1010	1	x		x			340.48	13.88
E - Inner Air Seal Assy	2115647		1	x				695.00		
F - Ring-Air Seal Assy	VE12360		1		x			715.00		
4. Burner Section								$ 10,320.72	$ 17,826.07	1,345.28
A - Cases and Ducts										
1 - Diffuser Case										
A - Inner Case	2114806	1009	1	x		x			3,400.00	52.80
B - Outer Case	2114807	1009	1	x		x			6,010.00	110.10
C - Strut	2114809	1009	12	x		x			316.20	130.50
D - Boss	2115013	5754	2		x			50.00		
E - Boss	2115014	5754	2		x			96.00		
F - Manifold Seg	2115015	1038	1		x	x			31.00	1.17
G - Manifold Seg	2115016	1038	1		x	x			31.00	1.17
H - Boss	2115018	5754	6		x			102.00		
I - Boss	2115019	5754	24		x			725.00		
J - Boss	2115021	5754	24		x			160.00		
K - Boss	2115105	5754	12		x			400.00		
L - Deflector	2114808	649	12	x				365.00		
M - Case Diffuser Assy	2114800		1			x				307.02
2 - Burner Case										
A - Inner Case										
1 - Front Flange	2119940	1009	1	x					190.14	2.62
2 - Rear Flange	2119942	1009	1	x		x			240.51	3.94
3 - Case	2119941	1033	1		x	x			42.00	1.03
4 - Inner Burner Case Assy	2119939		1			x				15.48
B - Outer Case Front										
1 - Flange	2119944	1009	1	x		x			508.74	3.74
2 - Flange	2119946	1009	1	x		x			377.34	4.79
3 - Case	2119945	1033	1		x	x			37.90	.90
4 - Out Br Cs Front Assy	2119943		1			x				19.55
C - Outer Case Rear										
1 - Flange	2119931	1009	1	x		x			482.27	5.78
2 - Flange	2119933	1009	1	x		x			434.93	5.03
3 - Case	2119938	1033	1		x	x			61.70	.91
4 - Out Case Rear Assy	2119930		1			x				23.00
3 - Transition Ducts										
A - Inner Trans Duct										
1 - Duct	2121401	5536	1		x	x			28.20	.99
2 - Spacer	2121402	5536	1		x	x			3.40	.33
3 - Support	2121403	5536	1		x	x			16.50	.86
4 - Flange	2121404	5754	1	x		x			264.00	6.73
5 - Liner	2121405	5536	1		x	x			74.00	1.12
6 - Ring	2121406	5754	1		x	x			62.00	3.06
7 - Ring	2121474	5536	1		x		x		7.45	.44
8 - Inr Tran Duct Assy	2121400		1			x				29.93
B - Outer Trans Duct										
1 - Duct	2121408	5536	1		x		x		38.60	1.89
2 - Ring	2121409	5536	1		x	x			109.00	3.30
3 - Spacer	2121410	5536	1		x	x			6.55	.33
4 - Ring	2121411	5754	1		x	x			72.00	11.54
5 - Duct	2121412	5536	1		x	x			54.50	1.74
6 - Ring	2121413	5536	1		x	x			10.30	.75

ESTIMATED STANDARD MATERIAL AND LABOR COSTS (CONTINUED)
SCHEDULE A

Description	Part Number	Matl	UPE	Estimating Source Code A	B	C	D	ENGINE PRIME COST Purchased	Material	Labor Hrs.
4. Burner Section (Continued)										
B - Outer Trans Duct										
7 - Case	2121414	5754	1	x		x		$	$ 1,047.89	17.84
8 - Tee	2121415	5754	48	x			x		98.00	7.20
9 - Seal Assembly										
A - Seal	2121417	5544	1		x		x		25.20	1.55
B - Seal	2121418	5544	1		x	x			25.20	1.55
C - Stop Ring	2121419	1038	1		x	x			17.10	1.13
D - Seal Assembly	2121416		1				x			2.10
10 - Out Trans Duct Assy	2121407		1			x				47.42
B - Bearings and Supports										
1 - No. 3 Bearing	2115203	724	1		x			505.00		
2 - No. 3 Bearing Support	2115708	5613	1		x		x		69.00	6.40
3 - No. 3 Bearing Sump Assembly	2115862	1009	1		x		x		838.76	42.20
C - Burner Components										
1 - Deflector Assembly										
A - Inner Ring	2114764	1009	1		x	x			108.00	4.60
B - Inner Ring Seg	2114765	1033	12		x	x			19.50	.64
C - Strut Fairing	2114766	649	12	x				702.00		
D - Outer Ring	2114767	1009	1	x		x			118.18	5.40
E - Outer Ring Seg	2114768	1033	12		x	x			24.40	.64
F - Deflector Assembly	2114763		1			x				27.00
2 - Annular Burn Assembly										
A - CC Sheet 18										
1 - Ring	2119815	5759	1		x	x			151.00	6.40
2 - CC Sheet 12										
A - CC Sheet 5										
1 - Scoop	2119767	5536	24		x	x			9.40	1.35
2 - Scoop	2119766	5536	24		x	x			8.15	1.35
3 - Deflector	2119768	5536	24		x	x			1.15	1.22
4 - Deflector	2119769	5536	24		x	x			2.02	1.22
5 - Scoop	2119770	5536	24		x	x			5.90	.40
6 - CC Sheet 5	2119849		24			x				9.10
B - CC Sheet 4										
1 - Scoop	2119765	5536	24		x		x		3.17	.96
2 - Deflector	2119764	5536	24		x		x		12.70	1.22
3 - Deflector	2119763	5536	24		x		x		7.72	1.22
4 - Scoop	2119762	5536	24		x		x		5.53	1.35
5 - Scoop	2119761	5536	24		x		x		5.37	1.35
6 - CC Sheet 4	2119849		24			x				8.08
C - Liner	2119794	5536	1		x	x			186.00	[illegible]
D - CC Sheet 12	2119849		1			x				14.20
3 - Liner	2119817	5536	1		x	x			116.00	1.82
4 - CC Sheet 11										
A - CC Sheet 3										
1 - Deflector	2119759	5536	24		x		x		7.05	1.22
2 - Scoop	2119758	5536	24		x		x		7.50	1.35
3 - Scoop	2119757	5536	24		x		x		6.20	1.35
4 - Scoop	2119760	5536	24		x		x		2.37	.96
5 - CC Sheet 3	2119849		24			x				14.90
B - CC Sheet 15										
1 - Scoop	2119750	5536	24		x	x			4.95	.40
2 - Scoop	2119771	5536	24		x	x			5.00	.40
3 - Deflector	2119751	5536	24		x		x		6.47	1.22
4 - Deflector	2119752	5536	24		x		x		1.15	1.22
5 - CC Sheet 15	2119849		24			x				6.62
C - Liner	2119793	5536	1		x	x			94.40	3.48
D - Plate	2119792	5536	24		x	x			.54	.08
E - CC Sheet 2										
1 - Scoop	2119756	5536	24		x		x		2.47	.96
2 - Deflector	2119755	5536	24		x		x		6.75	1.22
3 - Scoop	2119753	5536	24		x		x		3.62	1.35
4 - Scoop	2119754	5536	24		x		x		3.75	1.35
5 - CC Sheet 2	2119849		24			x				.29
F - CC Sheet 11	2119849		1			x				17.55
5 - Brace	2119811	5536	24		x			180.00		
6 - Brace	2119814	5536	48		x			48.00		

ESTIMATED STANDARD MATERIAL AND LABOR COSTS (CONTINUED)
SCHEDULE A

Description	Part Number	Matl	U P E	Estimating Source Code A	B	C	D	ENGINE PRIME COST Purchased	Material	Labor Hrs.
7 - Brace	2119813	5536	48	x				$ 335.00	$	
8 - Brace	2119812	5536	24	x				175.00		
9 - Brace	2119810	5536	48	x				370.00		
10 - CC Sheet 18	2119849		1			x				14.50
B - CC Sheet 19										
1 - Brace	2119806	5536	24	x				173.00		
2 - Brace	2119805	5536	48	x				360.00		
3 - Liner	2119819	5536	1	x	x				27.40	1.61
4 - CC Sheet 13										
A - CC Sheet 8										
1 - Scoop	2119778	5536	24	x		x			7.62	1.35
2 - Scoop	2119779	5536	24	x		x			5.45	1.35
3 - Deflector	2119780	5536	24	x		x			6.75	1.23
4 - Scoop	2119781	5536	24	x		x			1.18	.96
5 - CC Sheet 8	2119849	5536	24			x				12.60
B - Liner	2119795	5536	1	x	x				120.30	3.22
C - CC Sheet 6										
1 - Scoop	2119750	5536	24	x	x				4.95	.40
2 - Scoop	2119771	5536	24	x	x				5.00	.40
3 - Deflector	2119772	5536	24	x	x				.82	1.19
4 - Deflector	2119773	5536	24	x	x				1.48	1.23
5 - CC Sheet 6	2119849		24		x					6.40
D - Plate	2119792	5536	24	x	x				.54	.08
E - CC Sheet 7										
1 - Scoop	2119774	5536	24	x		x			2.98	1.35
2 - Scoop	2119775	5536	24	x		x			2.71	1.35
3 - Deflector	2119776	5536	24	x		x			6.50	1.22
4 - Scoop	2119777	5536	24	x		x			3.40	.96
5 - CC Sheet 7	2119848		24			x				6.46
F - CC Sheet 13	2119849		1			x				21.22
5 - Brace	2119807	5536	24	x				175.00		
6 - Brace	2119808	5536	48	x				344.00		
7 - Brace	2119809	5536	48	x				48.00		
8 - Ring	2119821	5536	1	x	x				5.62	.49
9 - Ring	2119822	5536	1	x	x				5.64	.50
10 - Ring	2119816	5759	1	x	x				240.00	13.23
11 - CC Sheet 14										
A - CC Sheet 10										
1 - Scoop	2119787	5536	24	x		x			6.75	1.35
2 - Scoop	2119788	5536	24	x		x			8.45	1.35
3 - Deflector	2119789	5536	24	x		x			5.42	1.22
4 - Deflector	2119790	5536	24	x		x			1.44	1.22
5 - Scoop	2119791	5536	24	x		x			.84	.96
6 - CC Sheet 10	2119849		24			x				12.60
B - CC Sheet 9										
1 - Scoop	2119782	5536	24	x	x				29.50	2.02
2 - Scoop	2119783	5536	24	x	x				29.50	2.02
3 - Deflector	2119784	5536	24	x	x				1.04	1.23
4 - Deflector	2119785	5536	24	x	x				1.64	1.27
5 - Scoop	2119786	5536	24	x	x				3.43	.96
6 - CC Sheet 9	2119849		24		x					10.70
C - Liner	2119796	5536	1	x	x				141.50	3.09
D - CC Sheet 14	2119849	5536	1		x					18.78
12 - Boss	2119827	5754	6	x				96.00		
13 - Plate	2119828	5536	6	x				12.00		
14 - Spacer	2119826	5754	12	x				3.72		
15 - CC Sheet 19	2119849		1			x				26.15
C - CC Sheet 17										
1 - Support	2119804	5759	12	x	x				109.20	5.48
2 - Brace	2119803	5536	12	x	x				2.83	.11
3 - Support	2119802	5536	1	x	x				22.20	.61
4 - Support	2119800	5536	1	x	x				21.00	2.04
5 - Liner	2119798	5536	1	x	x				53.80	1.56
6 - Support	2119801	5536	1	x	x				26.40	.61
7 - Support	2119799	5536	1	x	x				38.00	1.32
8 - Boss	2119823	5754	24	x	x				230.00	18.24
9 - CC Sheet 17	2119849		1			x				31.58

ESTIMATED STANDARD MATERIAL AND LABOR COSTS (CONTINUED)
SCHEDULE A

Description	Part Number	Matl	U P E	Estimating Source Code A	B	C	D	ENGINE PRIME COST Purchased	Material	Labor Hrs.
D - Ring	2119825	5754	24		x	x		$	$ 230.00	20.95
E - Swirl Guide	2119824	5754	24		x	x			347.00	34.70
F - Annular Burner Assembly	2119849		1			x				12.70
3 - Nozzles and Supports										
A - Nozzle and Support Assy	2118024		4			x		700.00		
B - Nozzle and Support Assy	2118023		10			x		1,750.00		
C - Nozzle and Support Assy	2118022		10			x		1,750.00		
4 - Fuel Manifolds										
A - Primary	VE12386		2			x		348.00		
B - Secondary	VE12387		2			x		348.00		
5. Turbine Section								256.00	79,019.88	2,131.40
A - Rotor										
1 - Blades										
A - 1st Stage	VE12361	659	74		x		x		6,600.00	257.00
B - 2nd Stage	VE12362	659	76		x		x		7,200.00	174.00
C - 3rd Stage	VE12363	659	66		x		x		2,540.00	187.00
2 - Disks										
A - 1st Stage	2121901	1013	1	x		x			4,500.00	26.15
B - 2nd Stage	2116002	1013	1		x	x			4,400.00	33.11
C - 3rd Stage	2115803	1013	1	x		x			5,000.00	24.73
3 - Hubs										
A - Front	2120024	1007	1	x		x			1,050.00	20.22
B - Rear	2120025	1007	1	x		x			1,278.00	29.10
4 - Seals and Plates										
A - 1st Stage										
1 - Front Plate and Seal	2116026	1007	1	x		x			1,153.00	51.85
2 - Vibration Dmpr Wts	2116028	5382	86	x				49.00		
3 - Rear Plates	2116029	1007	1	x		x			775.00	31.64
4 - Inner Rear Seal	2116042	1007	1	x		x			406.00	7.12
B - 2nd Stage										
1 - Inner Seal	2116077	1007	1		x	x			176.00	8.40
2 - Front Plates	2116076	1007	1	x		x			415.00	15.30
3 - Rear Plate and Seal	2116075	1007	1	x		x			896.00	41.22
B - Bearings and Supports										
1 - No. 4 Bearing	2115257	724	1	x				207.00		
2 - No. 4 Bearing Supports										
A - Flange	2115310	5706	1	x		x			195.40	3.06
B - Duct	2115311	5544	1		x	x			20.05	.81
C - Flange	2115312	5706	1	x		x			299.69	4.21
D - Support	2115313	5544	1		x	x			11.62	.42
E - Flange	2115314	5706	1	x		x			138.55	1.37
F - Flange	2115315	5706	1	x		x			166.58	1.96
G - Seal	2115354	5754	1		x		x		46.00	3.02
H - No. 4 Bearing Supt Assy	2115309		1			x				21.80
3 - No. 4 Bearing Housing										
A - Housing	2115323	5613	1	x		x			70.00	4.54
B - Support	2115322	5504	1		x	x			.08	.63
C - Housing	2115321	5613	1		x	x			7.50	1.65
D - Housing	2115320	5613	1		x	x			8.00	1.38
E - No. 4 Bearing Hsg Assy	2115325		1			x				10.30
C - Static Structures										
1 - Vanes										
A - 1st Vane	VE12364	663	46		x	x			1,250.00	138.00
B - 2nd Vane	VE12365	659	70		x	x			7,500.00	166.00
C - 3rd Vane	VE12366	659	78		x	x			9,000.00	136.00
2 - Seals and Diaphram										
A - Blade Tip Seals										
1 - 1st Tip Seal	2116136	5754	4	x		x			319.00	15.44
2 - 2nd Tip Seal	2116352	5754	4	x		x			543.42	27.24
3 - 3rd Tip Seal										
A - Ring	2116358	1004	1	x		x			370.00	33.61
B - Seal	2116353	5754	8	x		x			238.38	17.82
C - Assembly	2116359		1			x				.61
B - 1st Stage Diaphram										
1 - 1st Turb In Shroud	2116151	1004	1		x	x			1,300.00	30.50
2 - 1st Turb Seal Ring	2116030	5754	1	x		x			391.00	12.96
3 - Ring Segment	2116138	1004	14		x	x			394.00	15.00
4 - Ring Segment	2116139	1004	14		x	x			344.00	14.41

ESTIMATED STANDARD MATERIAL AND LABOR COSTS (CONTINUED)
SCHEDULE A

Description	Part Number	Matl	U P E	Estimating Source Code A	B	C	D	ENGINE PRIME COST Purchased	Material	Labor Hrs.
C - 2nd Stage Diaphram										
1 - 2nd Vn Inner Shrd	2115352	5754	1	x		x		$	$ 298.19	22.73
2 - 2nd Vn Inner Seal	2115492	5754	1	x		x			65.85	2.44
3 - 2nd Vn Inner Seal	2115493	5754	1	x		x			85.57	3.80
4 - 2nd Vn Inner Seal	2115491	5754	1		x	x			18.40	8.22
5 - 2nd Vn Inner Seal	2115490	5754	1		x	x			90.00	5.96
6 - 2nd Vn Plate	2115580	1004	1	x		x			143.00	26.61
D - 3rd Stage Diaphram										
1 - 3rd Vn Inner Shroud	2115653	5754	1		x	x			136.00	19.40
2 - 3rd Vn Inner Shroud	2115582	5754	1	x		x			71.34	3.75
3 - 3rd Vane Seal	2115581	5754	1		x	x			188.00	3.78
3 - Turbine Cases										
A - Front Case	2120035	1004	1	x		x			3,390.00	75.84
1 - Duct Trb Fr Case	2116148	5754	1	x		x			100.25	6.55
B - Rear Case	2120019	1004	1	x		x			3,240.00	45.25
4 - Exhaust Case										
A - Case Outer	2115159	1004	1	x		x			4,500.00	113.98
B - Vane Tk	2114554	655	3	x		x			1,050.00	25.00
C - Vane Nonsupport	2114454	655	5	x		x			1,750.00	33.40
D - Vane Support	2114354	655	8	x		x			2,800.00	61.90
E - Heatshield Ft	2115154	5510	16		x	x			7.54	1.67
F - Heatshield Rear	2115155	5510	16		x	x			7.52	1.69
G - Assembly	2115160		1			x				19.92
5 - Exit Cone and Nozzle										
A - Cone										
1 - Flange	2116691	5536	1		x	x			7.15	.27
2 - Cone Front	2116692	5536	1		x	x			22.60	.68
3 - Stiffener	2116694	5536	1		x	x			22.70	1.14
4 - Brace	2116695	5536	1		x	x			1.05	.14
5 - Cone Rear	2116697	5537	1		x	x			7.44	.42
6 - Cylinder	2116696	5537	1		x	x			4.36	.05
7 - Cone Assembly	2116693		1			x				7.94
B - Nozzle										
1 - Flange	2115233	5754	1	x		x			1,570.00	6.29
2 - Stiffener	2115234	5536	1		x	x			30.10	1.32
3 - Duct Front	2115235	5536	1		x	x			77.70	1.01
4 - Stiffener	2115236	5536	1		x	x			27.30	1.32
5 - Ring	2115237	5536	1		x	x			12.50	1.40
6 - Stiffener	2115238	5536	1		x	x			27.30	1.32
7 - Duct Rear	2115239	5536	1		x	x			10.60	1.69
8 - Stiffener	2115240	5536	1		x	x			20.50	1.32
9 - Stiffener	2115241	5536	1		x	x			35.00	1.34
10 - Seal Ring ID	2115242	5537	1		x	x			27.90	1.16
11 - Seal Ring OD	2115243	5537	1		x	x			171.50	.39
12 - Sl Rg Retainer	2115244	5536	1		x	x			.25	.58
13 - Nozzle Assy T/E	2115232		1			x				44.15
6. Augmentor Section								8,146.54	25,291.86	2,163.35
A - Ducts and Cases										
1 - Fan Exit Duct										
A - Flange	2115530	4966	1		x	x			265.00	15.45
B - Duct Segment	2115536	4966	4		x	x			304.00	10.20
C - Flange	2115544	4966	1		x	x			520.00	16.89
D - Flange	2115529	4966	1		x	x			520.00	16.22
E - Flange	2115543	4966	1		x	x			490.00	17.67
F - Duct Segment	2116013	4910	1		x	x			75.40	.12
G - Duct Segment	2116014	4910	1		x	x			56.20	.12
H - Duct Segment	2116015	4910	1		x	x			24.70	.08
I - Duct Segment	2116016	4910	1		x	x			24.70	.08
J - Boss	2115539	4966	1		x	x			238.00	8.96
K - Boss	2115540	4966	1		x	x			30.00	1.17
L - Strut	2115531	4966	4		x	x			104.80	5.06
M - Strut	2115563	4966	4		x	x			69.60	10.21
N - Strut	2115565	4910	4		x	x			13.53	.44
O - Strut	2115566	4910	4		x	x			50.40	.81
P - Strut	2115569	4910	4		x	x			13.88	.44

ESTIMATED STANDARD MATERIAL AND LABOR COSTS (CONTINUED)
SCHEDULE A

Description	Part Number	Matl	U P E	Estimating Source Code A	B	C	D	ENGINE PRIME COST Purchased	Material	Labor Hrs.
Q - Strut	2115570	4910	4		x	x		$	$ 50.40	.80
R - Strut	2115567	4910	4		x	x			13.82	.44
S - Strut	2115568	4910	4		x	x			44.40	.49
T - Strut	2114200	4966	4	x		x			44.88	5.78
U - Strut	2115579	4910	4		x	x			44.40	.49
V - Strut	2115564	4966	4		x	x			74.00	10.20
W - Strut	2115571	4910	4		x	x			13.92	.44
X - Strut	2115532	4966	4		x	x			89.20	5.06
Y - Duct Segment	2115538	4966	1		x	x			129.00	4.27
Z - Duct Segment	2115534	4966	3		x	x			228.00	10.20
AA - Duct Segment	2115537	4966	3		x	x			243.00	7.71
AB - Duct Segment	2115545	4910	6		x	x			105.00	.44
AC - Pin	2115573	5735	1		x			.54		
AD - Duct Segment	2115535	4966	1		x	x			115.00	5.85
AE - Duct Segment	2115533	4966	4		x	x			304.00	13.50
AF - Duct Segment	2115546	4910	6		x	x			126.00	.88
AG - Duct Assembly	2115528		1			x				142.00
2 - Duct Diffuser										
A - Duct Segments										
1 - Duct Segment	2115551	4910	4		x	x			1,600.00	2.33
2 - Flange	2115554	4966	4		x	x			496.00	8.24
3 - Flange	2115553	4966	4		x	x			400.00	8.60
4 - Flange	2115555	4966	4		x	x			184.00	9.16
5 - Spacer	2115556	4910	4		x	x			32.60	.11
6 - Flange	2116017	4966	4		x	x			184.00	9.16
B - Duct Segment Assembly										
1 - Duct Segment	2115541	4910	2		x	x			276.00	4.38
2 - Duct Segment L'R	2115542		2			x				4.02
3 - Duct Segment U'L	2115561	4910	2		x	x			308.00	4.38
C - Diffuser Case										
1 - Case	2116155	4966	1	x		x			1,400.00	26.13
2 - Case	2116156	4966	1	x		x			3,095.00	84.00
3 - Strut Rear	2116157	4966	8		x	x			199.00	19.60
4 - Strut Front	2116158	4910	8		x	x			51.80	4.00
5 - Case	2116163	4910	1		x	x			189.00	1.87
6 - Flange	2116164	4966	1	x		x			341.77	4.02
7 - Case Assembly	2116165		1			x				146.40
D - Duct Diff Assy	2115552		1			x				54.73
3 - Duct Burner Outer Case										
A - Channel	2115691	1009	60		x	x			205.00	17.85
B - Flange	2116285	1009	1		x	x			319.00	7.26
C - Case	2116286	1033	1		x	x			168.00	1.19
D - Flange	2116287	1009	1		x	x			428.00	7.83
E - Case Assy.	2116290		1			x				34.35
4 - Burner Inner Ducts										
A - Front Duct										
1 - Flange	2115446	5754	1	x		x			209.00	3.16
2 - Duct	2115445	5536	1		x	x			89.40	2.12
3 - Duct	2115449	5536	1		x	x			36.40	1.29
4 - Duct	2115442	5536	1		x	x			13.00	1.59
5 - Duct	2115441	5537	1		x	x			24.60	5.67
6 - Spacer	2115443	5536	36		x	x			6.13	1.05
7 - Duct Assembly	2115444		1			x				34.76
B - Rear Duct										
1 - Flange	2115437	5754	1		x	x			460.00	20.99
2 - Duct	2115436	5536	1		x	x			37.00	.97
3 - Duct	2115456	5754	1		x	x			95.00	13.19
4 - Duct	2115455	5536	1		x	x			38.80	.88
5 - Duct	2115439	5759	1		x	x			155.00	13.29
6 - Duct	2115458	5536	1		x	x			8.00	.82
7 - Band	2115447	5536	1		x	x			1.72	.22
8 - Guide	2115440	5537	1		x	x			34.70	1.08
9 - Spacer	2115747	5536	36		x	x			.85	.24
10 - Duct Assembly	2115435		1			x				33.98

ESTIMATED STANDARD MATERIAL AND LABOR COSTS (CONTINUED)
SCHEDULE A

Description	Part Number	Matl	UPE	Estimating Source Code A	B	C	D	ENGINE PRIME COST Purchased	Material	Labor Hrs.
5 - Rear Mount Case										
A - Ring Segment	2116275	1009	1	x		x		$	$ 172.00	3.94
B - Ring Segment	2116276	1009	2	x		x			69.00	1.74
C - Ring Segment	2116277	1009	1		x	x			515.00	21.67
D - Lug	2116278	1009	4	x		x			744.00	53.28
E - Case	2116281	1009	1		x	x			1,755.00	24.63
F - Case	2116283	1033	1		x	x			420.00	1.51
G - Flange	2116284	1009	1		x	x			447.00	7.62
H - Channel	2115683	1009	60		x	x			382.80	20.55
I - Case Assembly	2116282		1			x				150.90
B - Burner Components										
1 - Duct Burner										
A - Swirl Cup	2119996	5754	40		x	x			584.00	78.00
B - D/B Sheet 9										
1 - Seal	2119962	5536	20		x	x			4.60	.49
2 - Boss	2119995	5754	40		x	x			384.00	6.10
3 - Support	2119989	5536	8		x	x			16.20	1.19
4 - Support	2119975	5536	8		x	x			25.80	1.19
5 - Lug	2119990	5754	8		x		x		20.32	4.00
6 - Support	2119988	5536	1		x		x		11.50	2.64
7 - Support	2119987	5536	1		x		x		61.00	3.01
8 - Liner	2119974	5536	20		x		x		26.10	2.08
9 - Support	2119965	5536	1		x		x		50.60	1.93
10 - Ring	2119961	5754	1		x	x			168.00	72.00
11 - Ring	2119960	5754	1		x	x			142.00	72.00
12 - Support	2119964	5536	1		x	x			11.90	.84
13 - Brace	2119991	5536	32	x		x			20.80	2.19
14 - Stiffener	2119992	5536	32		x	x			14.60	6.50
15 - Stiffener	2119994	5536	32		x	x			7.72	.93
16 - Stiffener	2119993	5536	32		x	x			7.24	.93
17 - Sheet 9 Assembly	2119942-9		1			x				92.20
C - D/B Sheet 7										
1 - Plate	2119981	5536	160		x	x			12.20	.92
2 - D/B Sheet 3										
A - Liner	2119954	5536	1		x	x			51.50	4.22
B - D/B Sheet 2										
1 - Deflector	2119953	5536	40		x	x			3.06	.59
2 - Scoop	2119952	5536	40		x	x			12.32	1.43
3 - Scoop	2119951	5536	40		x	x			12.32	1.43
4 - Sheet 2 Assy	2119947-2		40			x				16.80
C - D/B Sheet 10										
1 - Deflector	2119950	5536	40		x	x			1.72	.59
2 - Scoop	2119949	5536	40		x	x			8.50	1.43
3 - Scoop	2119948	5536	40		x	x			1.50	1.43
4 - Sheet 10 Assy	2119947-10		40			x				14.15
D - Sheet 3 Assembly	2119947-3		1				x			28.40
3 - Sheet 7 Assembly	2119947-7		1			x				41.50
D - D/B Sheet 8										
1 - Plate	2119981	5536	158		x	x			12.20	.92
2 - Plate	2119986	5536	2		x	x			.56	.06
3 - D/B Sheet 5										
A - Liner	2119956	5536	1		x	x			63.20	4.66
B - D/B Sheet 2										
1 - Deflector	2119953	5536	40		x	x			3.06	.59
2 - Scoop	2119952	5536	40		x	x			12.32	1.43
3 - Scoop	2119951	5536	40		x	x			12.32	1.43
4 - Sheet 2 Assy	2119947-2		40			x				16.80
C - D/B Sheet 10										
1 - Deflector	2119950	5536	40		x	x			1.72	.59
2 - Scoop	2119949	5536	40		x	x			8.50	1.43
3 - Scoop	2119948	5536	40		x	x			1.50	1.43
4 - Sheet 10 Assy	2119947-10		40			x				14.15
D - Sheet 5 Assembly	2119947-5		1			x				29.40
4 - D/B Sheet 8 Assembly	2119947-8		1			x				51.00

ESTIMATED STANDARD MATERIAL AND LABOR COSTS (CONTINUED)
SCHEDULE A

Description	Part Number	Matl	UPE	Estimating Source Code A	B	C	D	ENGINE PRIME COST Purchased	Material	Labor Hrs.
E - Nozzle										
1 - Flange	2115429	5759	1		x	x		$	$ 244.00	7.34
2 - Nozzle	2115426	5537	1		x	x			54.00	2.71
3 - Spacer	2115432	5536	24		x	x			3.42	.90
4 - Support	2115428	5759	1		x	x			65.00	6.99
5 - Spacer	2115433	5536	24		x	x			3.57	.90
6 - Liner	2115427	5536	1		x	x			13 .00	5. 3
7 - Stiffener	2115431	5759	1	x		x			15 .61	3.45
8 - Seal	211 434	5537	1		x	x			16.33	1.03
9 - Seal	211 947	5537	1		x	x			4.68	1.08
10 - Support	21 5430	5759	1	x		x			225.34	7.60
11 - Nozzle DB Assy	2 15425		1			x				47.50
F - Deflector										
1 - Support	2115676	5536	60		x	x			24.50	20.27
2 - Deflector	21156 7	553o	120		x	x			10.85	1.82
3 - Bracket	2115c 78	5536	120		x	x			1.49	1.70
4 - Deflector	2115679	5536	60		x	x			3.07	.86
5 - Deflector Assembly	2115675		60			x				33.60
G - Deflector										
1 - Support	2119979	5536	30		x	x			7.97	1.02
2 - Deflector	2119978	5536	120		x	x			41.20	3.60
3 - Deflector	2119977	5536	60		x	x			24.40	1.35
4 - Bracket	2119976	5536	120		x	x			12.00	1.48
5 - Deflector Assembly	2119980		30			x				24.40
H - Liner Assembly										
1 - Liner	2115685	553o	60		x				149.00	
2 - Assembly	2115684		60			x				38.60
I - Liner Assembly										
1 - Liner	2115690	5536	60		x				124.20	
2 - Assembly	2115689		60			x				35.05
J - Liner Assembly										
1 - Liner	2115697	553o	60		x				69.60	
2 - Assembly	2115698		60			x				26.90
K - Rear Support										
1 - Support	2115692	5754	1	x		x			800.00	70.05
2 - Support	2115693	5536	1		x	x			11.65	.92
3 - Flange	2115694	5536	1		x	x			11.30	1.12
4 - Support Assembly	2115695		1			x				9.19
L - Duct Burner Assembly	2119947-1		1			x				28.70
2 - Nozzles and Supports										
A - Nozzle and Hsg Assy	2115985		20	x				3,500.00		
B - Nozzle and Hsg Assy	2115986		10	x				1,750.00		
C - Nozzle and Hsg Assy	2115987		2	x				350.00		
D - Nozzle and Hsg Assy	2115990		8				x	1,400.00		
3 - Fuel Manifolds										
A - DB Primary Manifold	VE12388		2		x			573.00		
B - DB Secondary Manifold	VE12389		2		x			573.00		
7. Variable Nozzle								1,978.00	18,116.00	930.00
8. Reverser Suppressor								27,596.00	14,452.00	2,485.00
9 Accessories and Valves								50,536.06	3,991.00	378.50
A - Controls and Valves										
1 - C/D Valve										
A - Main	VE12367		1		x			700.00		
B - Duct High	VE12368		1		x			700.00		
C - Duct Low	VE12369		1		x			700.00		
2 - Breather Pressure Valve	VE12376		1		x			644.10		
3 - Valve-Fuel By Pass	VE12378		1		x		x	17.00	22.00	8.50
4 - DB Mixer Valve	VE12380		1	x				540.00		
5 - Unitized Fuel Control	VE12381		1	x				28,500.00		
6 - Aero Brake V/G Cyl	VE12371		2		x			392.06		
B - Electrical										
1 - Ignition	VE12384		1	x				1,755.00		

ESTIMATED STANDARD MATERIAL AND LABOR COSTS (CONTINUED)
SCHEDULE A

Description	Part Number	Mat'l	U P E	Estimating Source Code A	B	C	D	ENGINE PRIME COST Purchased	Material	Labor Hrs.
C - Pumps and Gearbox										
1 - Hydraulic Pump	VE12370		1	x				$ 4,450.00	$	
2 - Fuel Pump										
A - Main	VE12373		1	x				1,400.00		
B - Duct Fuel	VE12377		1	x				6,800.00		
3 - Gearbox										
A - Controls Drive	VE12382		1		x		x	960.00	812.00	126.00
B - Oil Pump and Tach Drive	VE12383		1		x		x	547.00	582.00	60.00
4 - Main Fuel Htr and Fltr	VE12379		1		x		x	1,060.00	1,205.00	92.00
D - Lubrication										
1 - Oil Tank	VE12385		1		x			700.00		
2 - Fuel Oil Cooler										
A - Duct	VE12374		1		x		x	240.00	685.00	47.00
B - Main	VE12375		1		x		x	140.00	685.00	45.00
3 - Main Strainer	VE12372		1		x			291.00		
10. Assembly and Test									2,089.00	1,224.90
11. Miscellaneous								38,750.00	11,832.00	783.80
Total								$203,668.52	$246,065.48	13,343.19

ABBREVIATIONS USED

U
P - Units Per Engine
E

Estimating Source Code

A - Purchasing Department Quote

B - Value Engineering Estimate

C - Production Engineering Estimate

D - Value Engineering Estimate

FINANCIAL PLAN - PHASE V

Assumptions

1. The cumulative customer payments for 1200 equivalent supersonic transport engines (installation engines, plus spare engines and spare parts) includes service and warranty provisions, all of the post-aircraft-certification engineering, and profit, and excludes interest charges and amortization of the pre-aircraft-certification development cost.

2. Firm orders for 400 engines will be received by January 1, 1970.

3. An additional 120 engines will be ordered each year beginning in July, 1970 until 1200 equivalent engines in total have been ordered.

4. The engine customer will make an initial 5% deposit for 800 aircraft installation engines on placement of orders. Thereafter, it has been assumed that the engine customer will make five equal payments each six months, beginning 30 months prior to delivery of the engines in aircraft and continuing until 50% of the estimated purchase price shall have been deposited six months prior to delivery of the aircraft. The remaining 50% of the purchase price has been assumed to be paid on delivery of the engines in aircraft. The 400 equivalent engines (spare engines and spare parts) will be paid for 100% on delivery.

5. Under the payment plan described above, the engine manufacturer has assumed the availability of Government-guaranteed loans. We have further assumed that the interest cost of these loans for the period required will be estimated by the FAA.

6. The estimated delivery price is based on 1967 dollars.

FINANCIAL PLAN - PHASE V (CONT)

Assumptions (cont)

7. Delivery Schedules

Calendar Year	Engine Delivery Schedule	Install Engines (Based on Aircraft Delivery Schedule)	Equivalent Spare Engines
1972 - 1st	16		
- 2nd	22		
1973 - 1st	40		
- 2nd	62		12
1974 - 1st	96	24	24
- 2nd	108	96	36
1975 - 1st	108	72	36
- 2nd	108	76	38
1976 - 1st	108	76	38
- 2nd	108	72	36
1977 - 1st	108	72	36
- 2nd	108	72	36
1978 - 1st	108	72	36
- 2nd	70	72	36
1979 - 1st	30	72	36
- 2nd		24	
	1,200	800	400

SUMMARY FORMAT A
PHASE V
PRODUCTION ENGINES

				Average Unit	Total Program
Level II					
1	V	QUALITY CONTROL		INCLUDED IN VI BELOW	
2		Direct Labor	Hrs.		
3		Direct Labor	Amt.		
4		Overhead	"		
5		Subcontracted Effort	"		
6		Overtime Premium	"		
7		Materials	"		
8		Other Direct Charges	"		
9		TOTAL QUALITY CONTROL			
10					
11	VI	MANUFACTURING COSTS			
12		Direct Labor	Hrs.	See Page	
13		Direct Labor	Amt.	$ 103,865	$ 124,638,000
14		Overhead	"	266,933	320,319,600
15		Subcontracted Effort	"	INCLUDED IN MATERIAL	
16		Overtime Premium	"	INCLUDED IN LABOR VARIATIONS	
17		Materials	"	455,469	546,562,800
18		Other Direct Charges	"		
19		TOTAL MANUFACTURING COSTS		$ 822,267	$ 991,520,400
20					
21	VII	OTHER EFFORT			
22		Direct Labor	Hrs.		
23		Direct Labor	Amt.		
24		Overhead	"		
25		Subcontracted Effort	"		
26		Overtime Premium	"		
27		Materials	"		
28		Other Direct Charges	"		
29		TOTAL OTHER EFFORT *		49,576	59,491,200
30		TOTAL DIRECT COST			
31					
32	VIII	GEN'L AND ADMIN EXPENSE		74,364	89,236,800
33		TOTAL COST		950,207	1,140,248,400
34	IX	TOTAL SUSTAINING ENGINEERING		150,363	180,436,000
35	X	FEE/PROFIT		110,057	132,068,400
36		ESTIMATED TOTAL PRICE		$1,210,627	$1,452,752,800
37					
38					

* Provision for Customer Service Allowance (Warranty, etc.)

TOTAL AVERAGE UNIT MATERIAL AND DIRECT LABOR
(TYPICAL FORMAT A BACKUP INFORMATION)

	Purchase	Material	Labor Dollars	Labor Hours
Total (Schedule A)	$203,669	$242,065	$	13,343
Standard Labor Allowances 98.5%				13,143
Total				26,486
1967 Base Rate per $2.86			75,750	
Total	$203,669	$242,065	$75,750	
Learning Effect on Standard for 1,200 Units				
Material 94% Curve				
.96400	(7,332)	(8,713)		
Labor 85% Curve				
.926460			(5,571)	
Total	$196,337	$233,351	$70,179	
Variations				
Material 6%	11,780	14,001		
Labor 48%			33,686	
Total	$208,117	$247,352	$103,865	
TOTAL MATERIAL AND LABOR				
FORMAT A		$455,469	$103,865	

COMPUTATION OF AVERAGE UNIT DIRECT LABOR HOURS

		Labor Dollars	Labor Hours
Total (Schedule A)			13,343
Standard Labor Allowance 98.5%			13,143
Total at $2.86/hour		$ 75,750	26,486
Learning Effect on Standard Labor 85% Curve = .926460		$(5,571)	(1,948)
Total		$ 70,179	24,538
Labor Variations *			
Overtime, Night Shift and Third Shift Bonus	21%	14,738	-
All Other	27%	18,948	6,625
Total	48%	$103,865	31,163 **

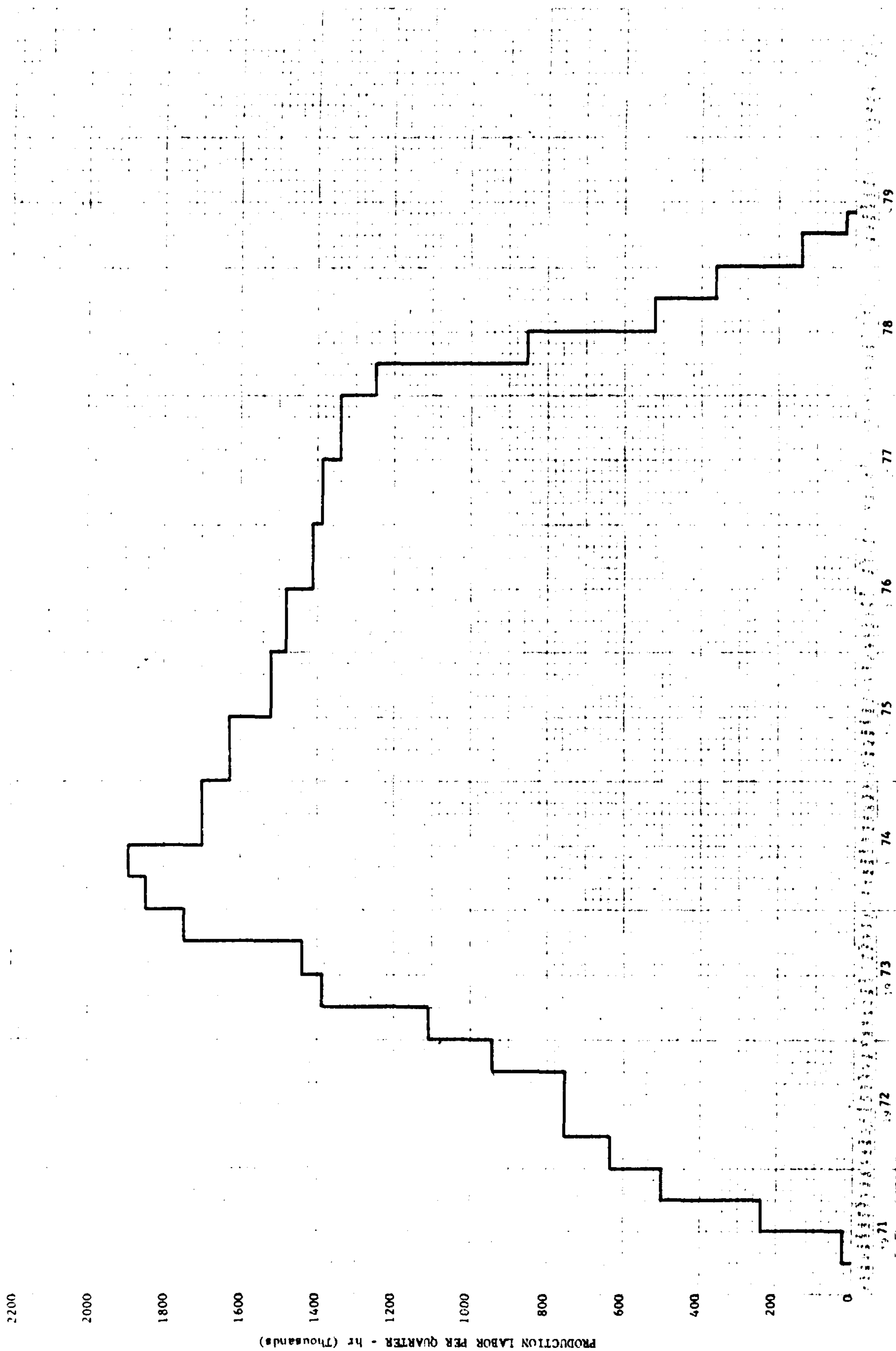
* Computation of Manhour Variations

Standard Labor	69,900
Overtime Premium	7,000
Night Shift and Third Shift	7,500
Total	14,500
Rate	21%

** Total Format C $\frac{37,395,600 \text{ Hours}}{1,200 \text{ Engines}}$ = 31,163 Hours

PHASE V JTF17A-21 PRODUCTION LABOR (FORMAT B AND C)

Year	Quarter	Labor Dollars (Millions)	Cumulative Dollars (Millions)	Labor Hours (000)	Cumulative Hours
1971	1	0.0	0.0	-	-
	2	.1	.1	27	27
	3	.8	.9	239	266
	4	1.7	2.6	503	769
1972	1	2.1	4.7	638	1,407
	2	2.6	7.3	780	2,187
	3	2.7	10.0	807	2,994
	4	2.9	12.9	868	3,862
1973	1	3.7	16.6	1,111	4,973
	2	4.6	21.2	1,389	6,362
	3	5.1	26.3	1,525	7,887
	4	5.6	31.9	1,667	9,554
1974	1	6.1	38.0	1,845	11,399
	2	6.3	44.3	1,892	13,291
	3	5.9	50.2	1,762	15,053
	4	5.5	55.7	1,639	16,692
1975	1	5.4	61.1	1,628	18,320
	2	5.4	66.5	1,628	19,948
	3	5.2	71.7	1,555	21,503
	4	5.0	76.7	1,489	22,992
1976	1	4.9	81.6	1,483	24,475
	2	4.9	86.5	1,483	25,958
	3	4.8	91.3	1,436	27,394
	4	4.6	95.9	1,392	28,786
1977	1	4.6	100.5	1,388	30,174
	2	4.6	105.1	1,388	31,562
	3	4.5	109.6	1,356	32,918
	4	4.4	114.0	1,326	34,244
1978	1	4.2	118.2	1,250	35,494
	2	2.9	121.1	856	36,350
	3	1.7	122.8	524	36,874
	4	1.2	124.0	360	37,234
1979	1	.5	124.5	141	37,375
	2	.1	124.6	21	37,396



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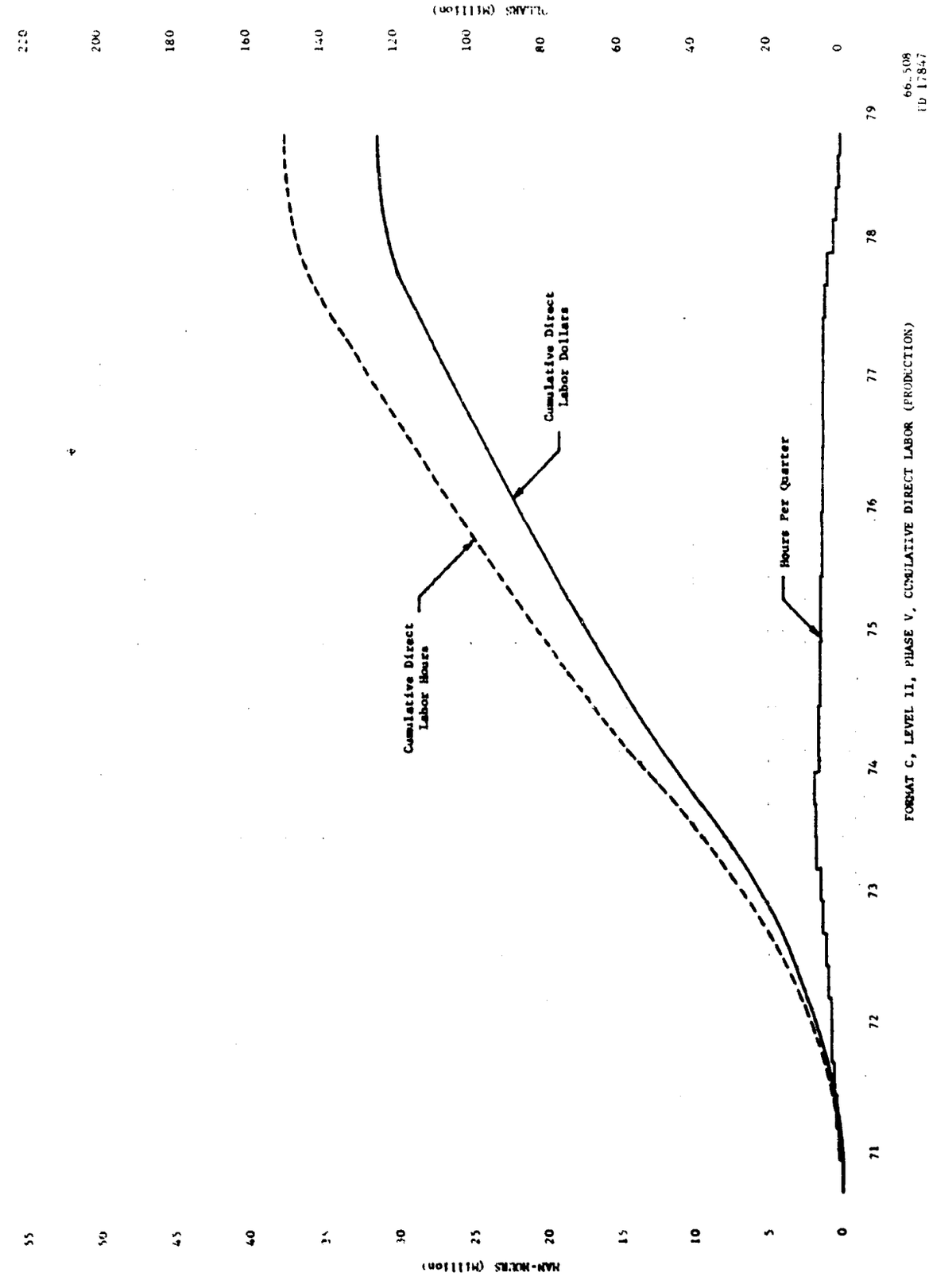
FORMAT B, LEVEL II, PHASE V, PRODUCTION LABOR HOURS

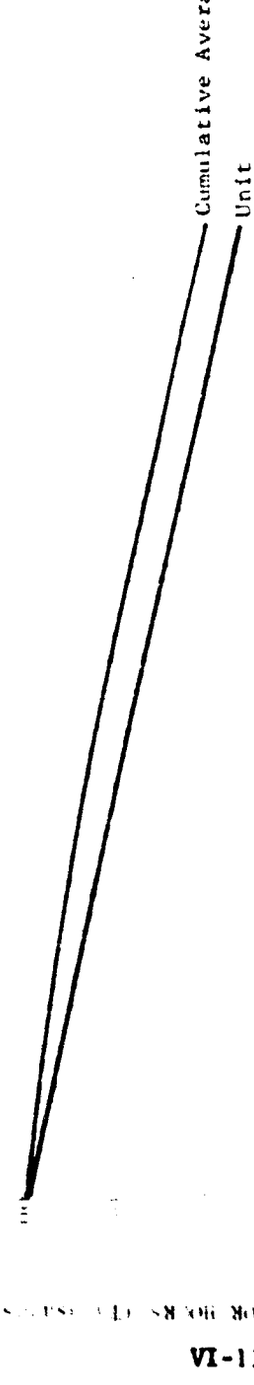


FORMAT C, LEVEL II, PHASE V, CUMULATIVE DIRECT LABOR (PRODUCTION)

TABULATION FORMAT G
DIRECT LABOR STANDARD HOURS

Engines	Unit Labor Hours	Cumulative Average Labor Hours
1	99,225	99,225
2	84,345	91,785
3	76,698	86,756
6	65,196	77,534
10	57,839	70,615
50	39,663	50,640
100	33,715	43,424
280	26,486	34,362
500	23,120	30,065
1,200	18,830	24,538

Format G



FUNDING PLAN

The Funding Plan on the pages which follow includes:

1. Composite cumulative development cost curves depicting Phases III, IV, and V separately and in total.

2. A similar composite curve by phases and in total for development plus product support.

3. Phase III Curve - 1967 dollars

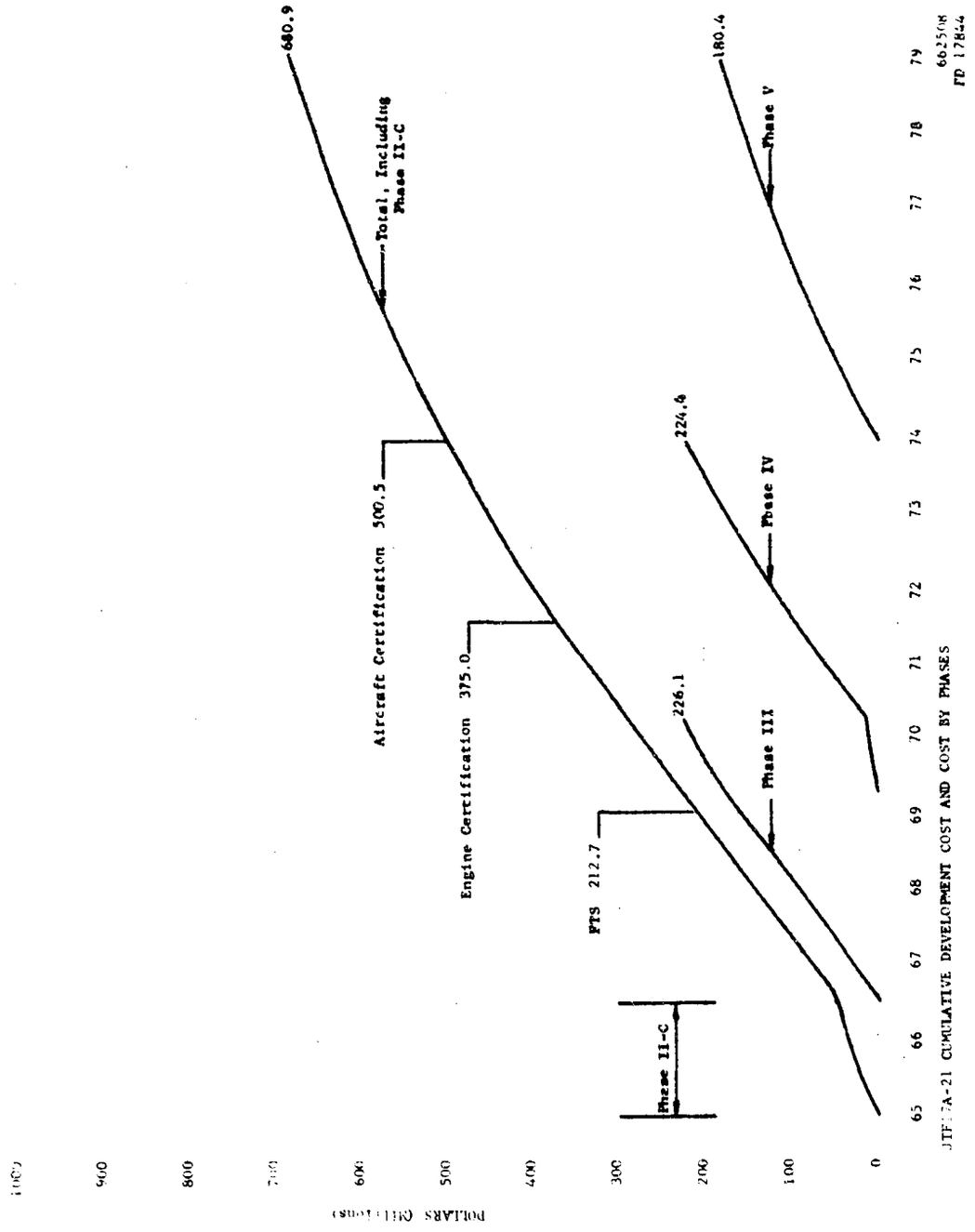
4. Curves showing cumulative costs and costs plus commitments by phases and for the total program with associated tabular data.

JTF17A-21 DEVELOPMENT PLUS PRODUCT SUPPORT
CUMULATIVE COSTS AND COSTS PLUS COMMITMENTS
(MILLIONS OF DOLLARS)

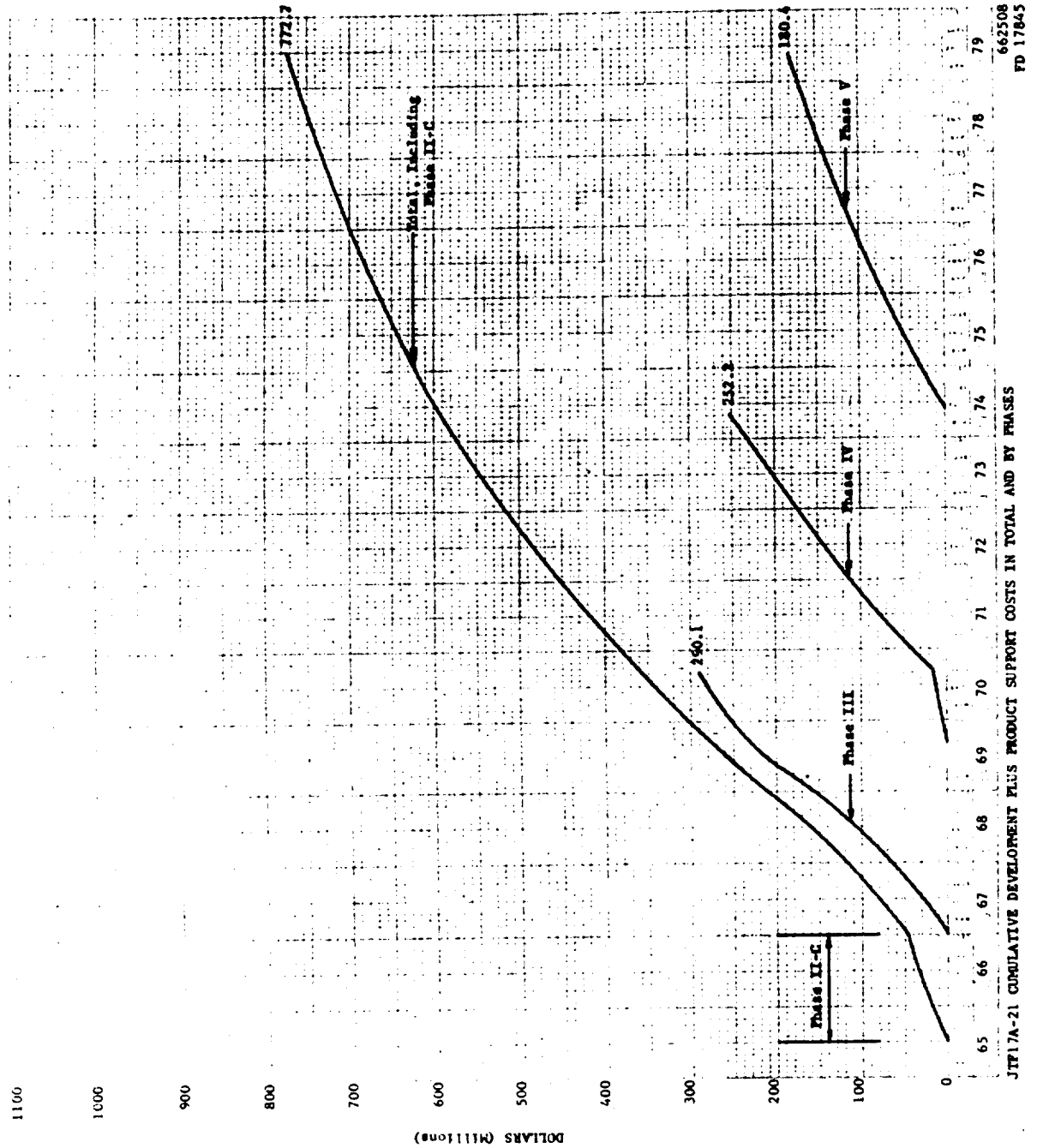
	Phase III			Phase IV		
Calendar Year	Cost	Commit-ment	Cost Plus Commit.	Cost	Commit-ment	Cost Plus Commit.
1967 - 1st Half	31.4	20.0	51.4			
2nd Half	65.8	45.0	110.8			
1968 - 1st Half	110.2	38.0	148.2			
2nd Half	159.4	30.0	189.4			
1969 - 1st Half	216.5	25.0	241.5			
2nd Half	253.6	12.0	265.6	2.5	10.0	12.5
1970 - 1st Half	282.3	3.0	285.3	12.4	19.0	31.4
2nd Half	290.1	-	290.1	40.8	22.0	62.8
1971 - 1st Half				79.9	22.0	101.9
2nd Half				113.7	22.0	135.7
1972 - 1st Half				147.0	19.0	166.0
2nd Half				176.3	17.0	193.3
1973 - 1st Half				205.5	17.0	222.5
2nd Half				233.4	13.0	246.4
1974 - 1st Half				252.2	-	252.2

PHASE V - DELIVERY OF 1200 PRODUCTION ENGINES
FUNDING PLAN (1967 DOLLARS IN MILLIONS)

Calendar Year	Unliquidated Commitments	Cumulative Expenditures	Cumulative Customer Payments
1970 - 1st	$	$	$ 24.2
- 2nd	5.9		27.8
1971 - 1st	18.7	5.6	31.5
- 2nd	25.3	34.9	37.7
1972 - 1st	33.0	81.0	54.4
- 2nd	47.0	137.7	79.0
1973 - 1st	55.9	221.3	111.8
- 2nd	57.0	323.9	166.2
1974 - 1st	64.5	442.5	252.5
- 2nd	61.0	567.2	394.3
1975 - 1st	57.9	687.6	521.6
- 2nd	54.9	799.6	653.3
1976 - 1st	52.9	908.5	784.5
- 2nd	50.2	1,012.4	910.9
1977 - 1st	45.3	1,114.5	1,032.0
- 2nd	25.4	1,210.4	1,145.4
1978 - 1st	12.1	1,277.5	1,250.8
- 2nd	2.4	1,310.5	1,348.4
1979 - 1st		1,320.7	1,438.2
- 2nd			1,452.8



JTF17A-21 CUMULATIVE DEVELOPMENT COST AND COST BY PHASES


772.7
Incl. Tooling Phase II-C
130.4
Phase V
232.8
Phase IV
250.1
Phase III
Phase II-C
DOLLARS (Millions)
1100
1000
900
800
700
600
500
400
300
200
100
0
65
66
67
68
69
70
71
72
73
74
75
76
77
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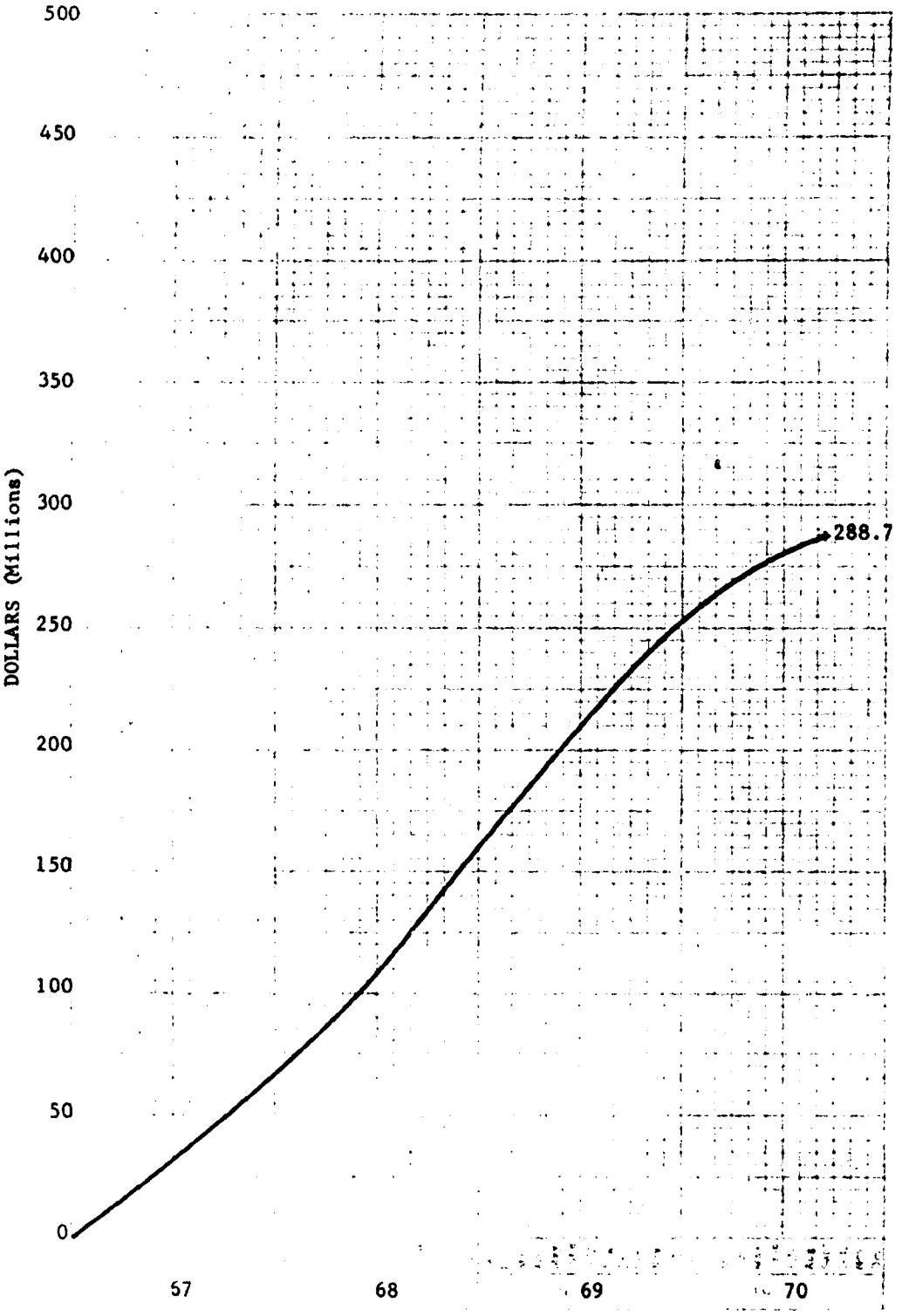
JTF17A-21 CUMULATIVE DEVELOPMENT PLUS PRODUCT SUPPORT COSTS IN TOTAL AND BY PHASES



JTF17A-21 DEVELOPMENT PLUS PRODUCT SUPPORT, PHASE III
(1967 Dollars)

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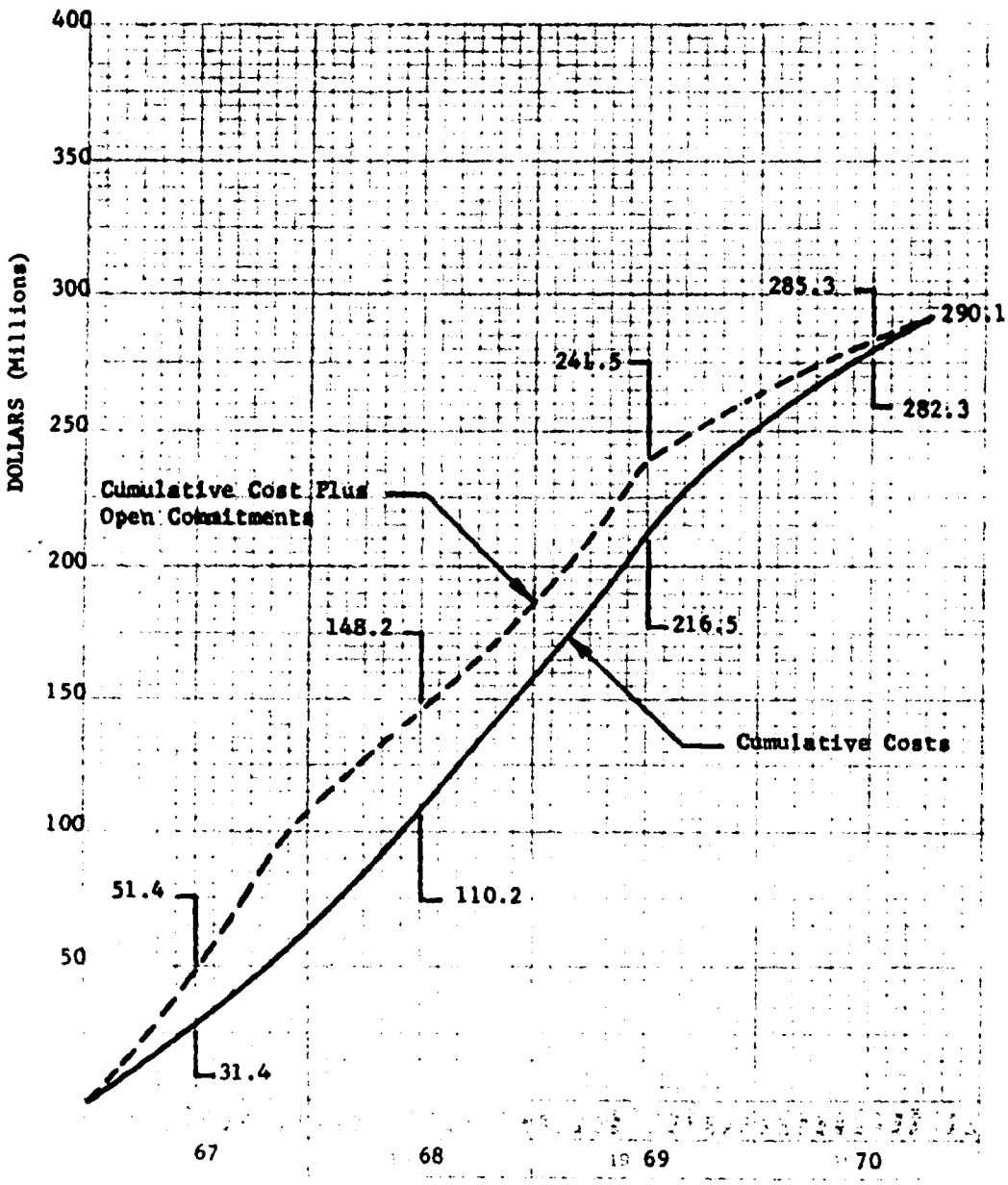

JTF17A-21 PHASE III, CUMULATIVE EXPENDITURES PLUS COMMITMENTS

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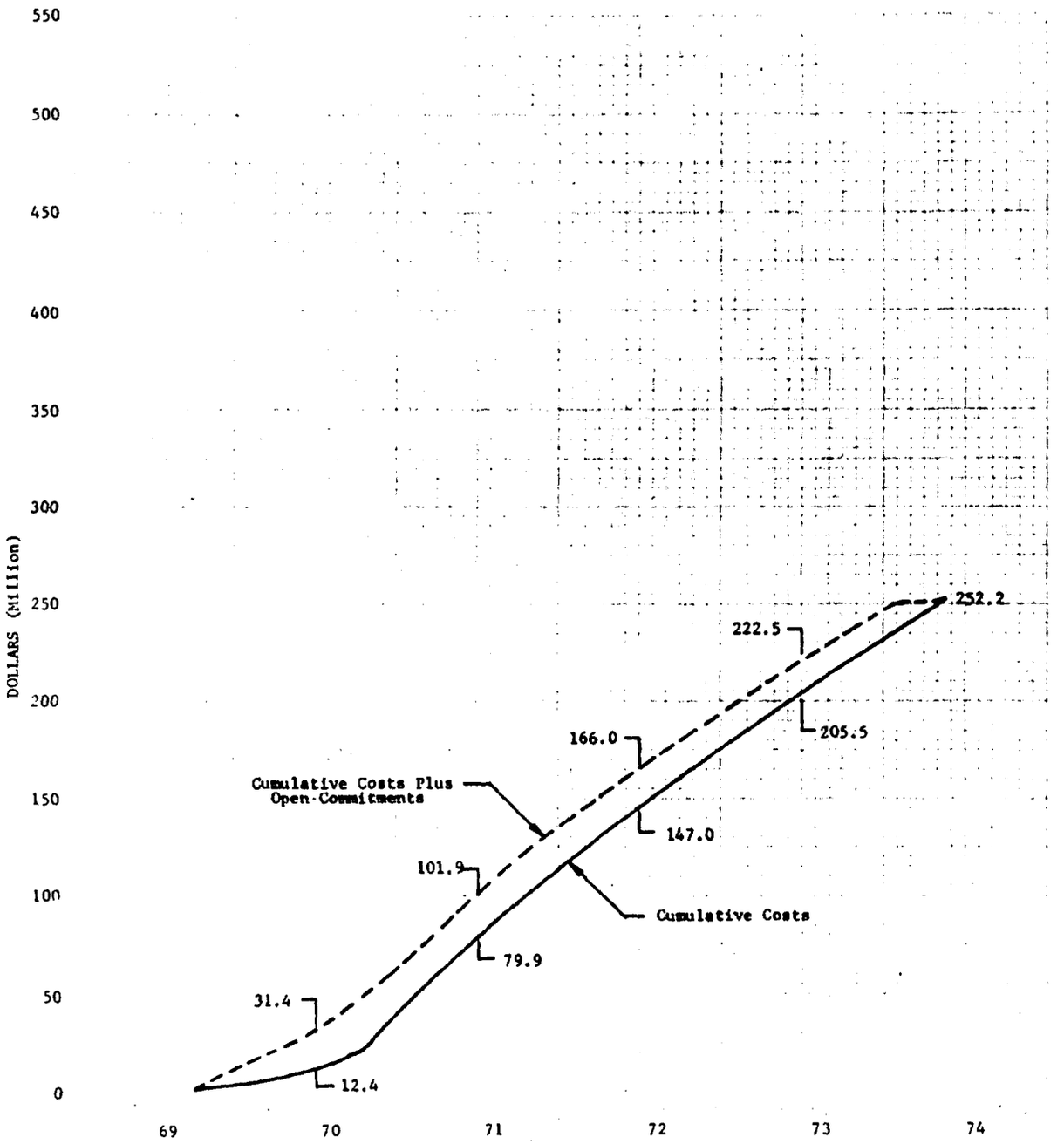

JTF17A-21 PHASE IV, CUMULATIVE EXPENDITURES PLUS COMMITMENTS

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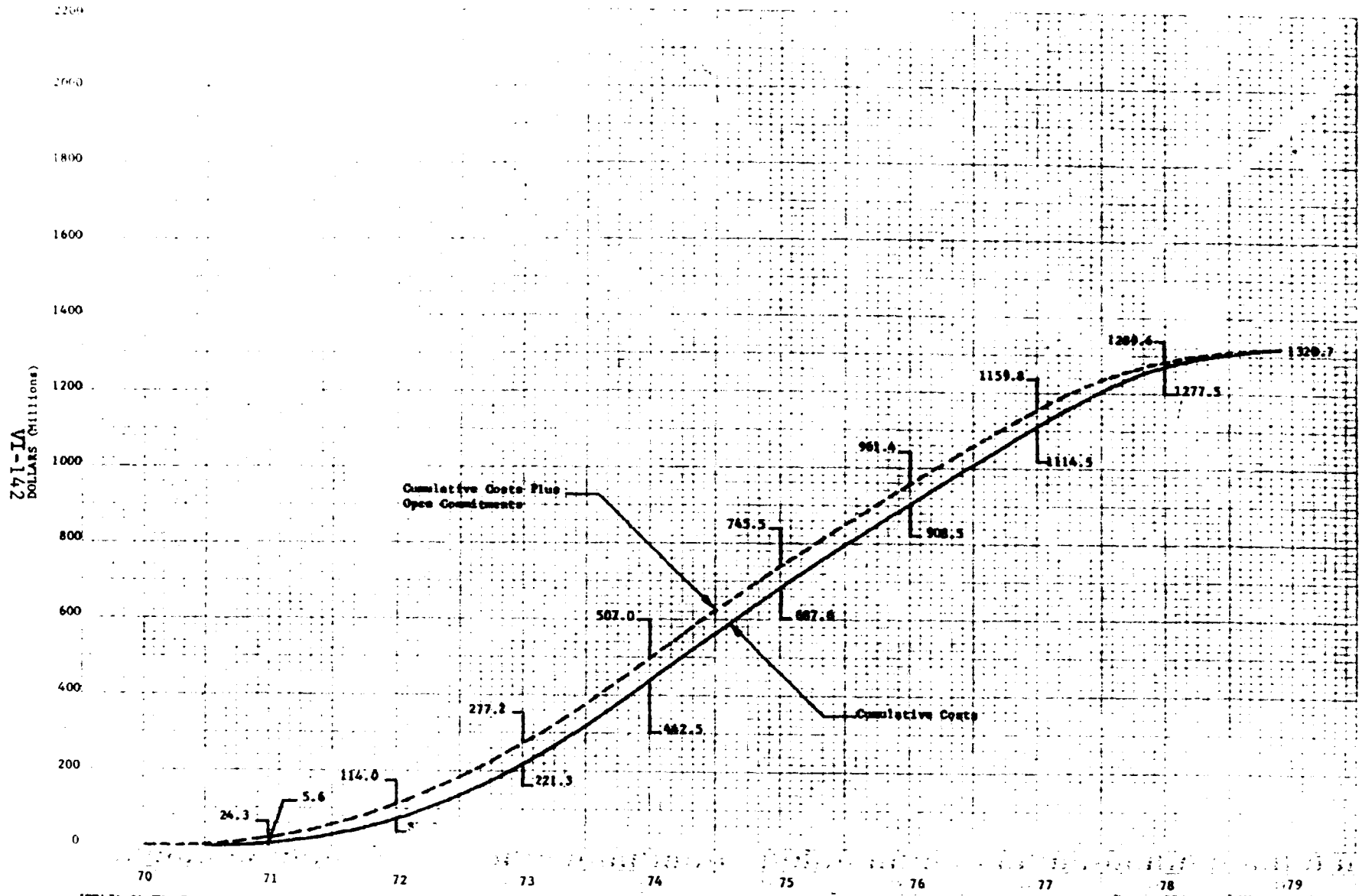

JTF17A-21 PHASE V, CUMULATIVE EXPENDITURES PLUS COMMITMENTS

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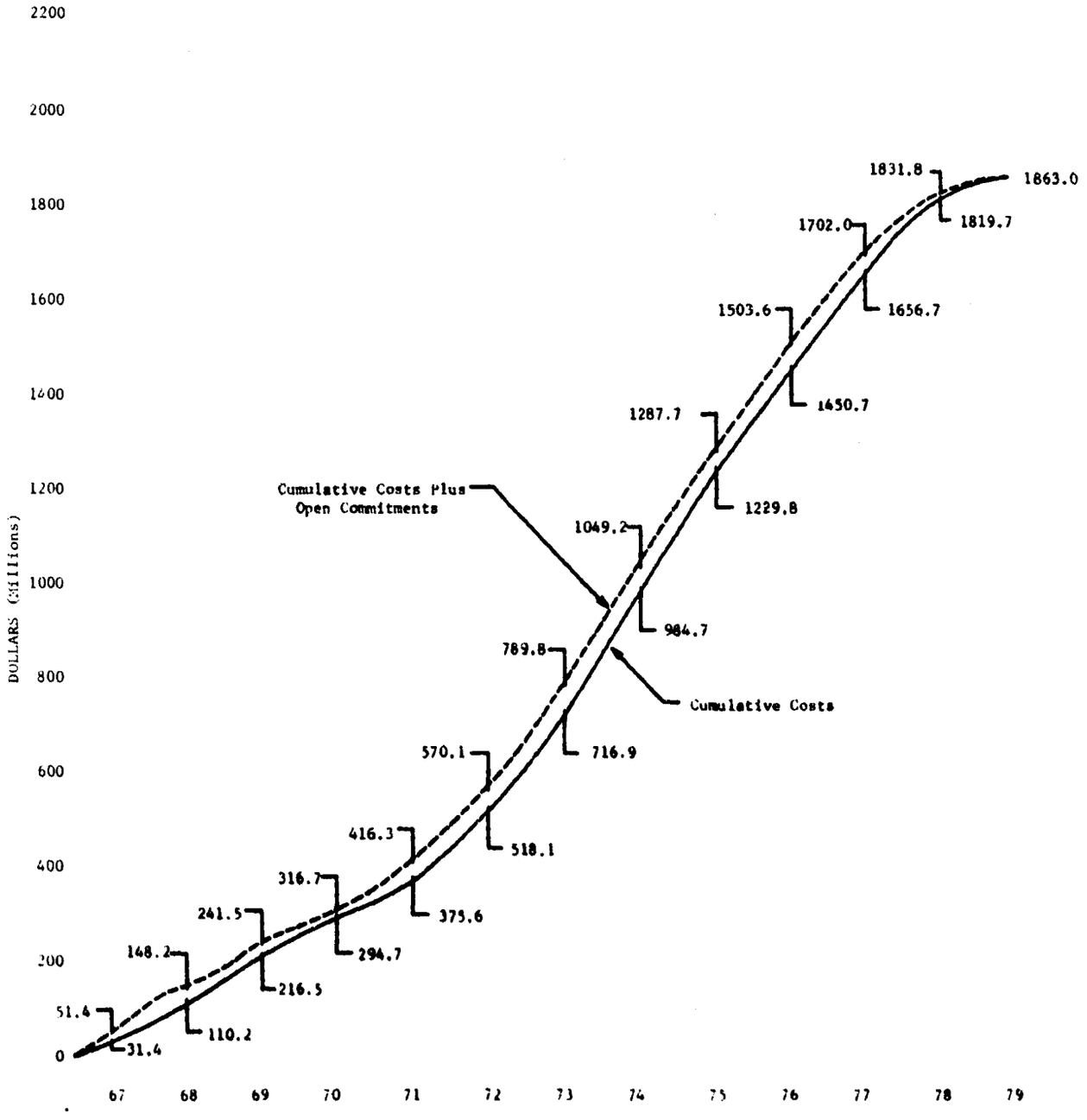

JTF17A-21 CUMULATIVE EXPENDITURES PLUS COMMITMENTS - TOTAL PROGRAM

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